Gas Journal

VOL. 280 106TH YEAR. LONDON, OCTOBER 13, 1954. NO. 4767. PRICE 1/3

C. & W. WALKER LTD.

DONNINGTON, Nr. WELLINGTON-SHROPSHIRE

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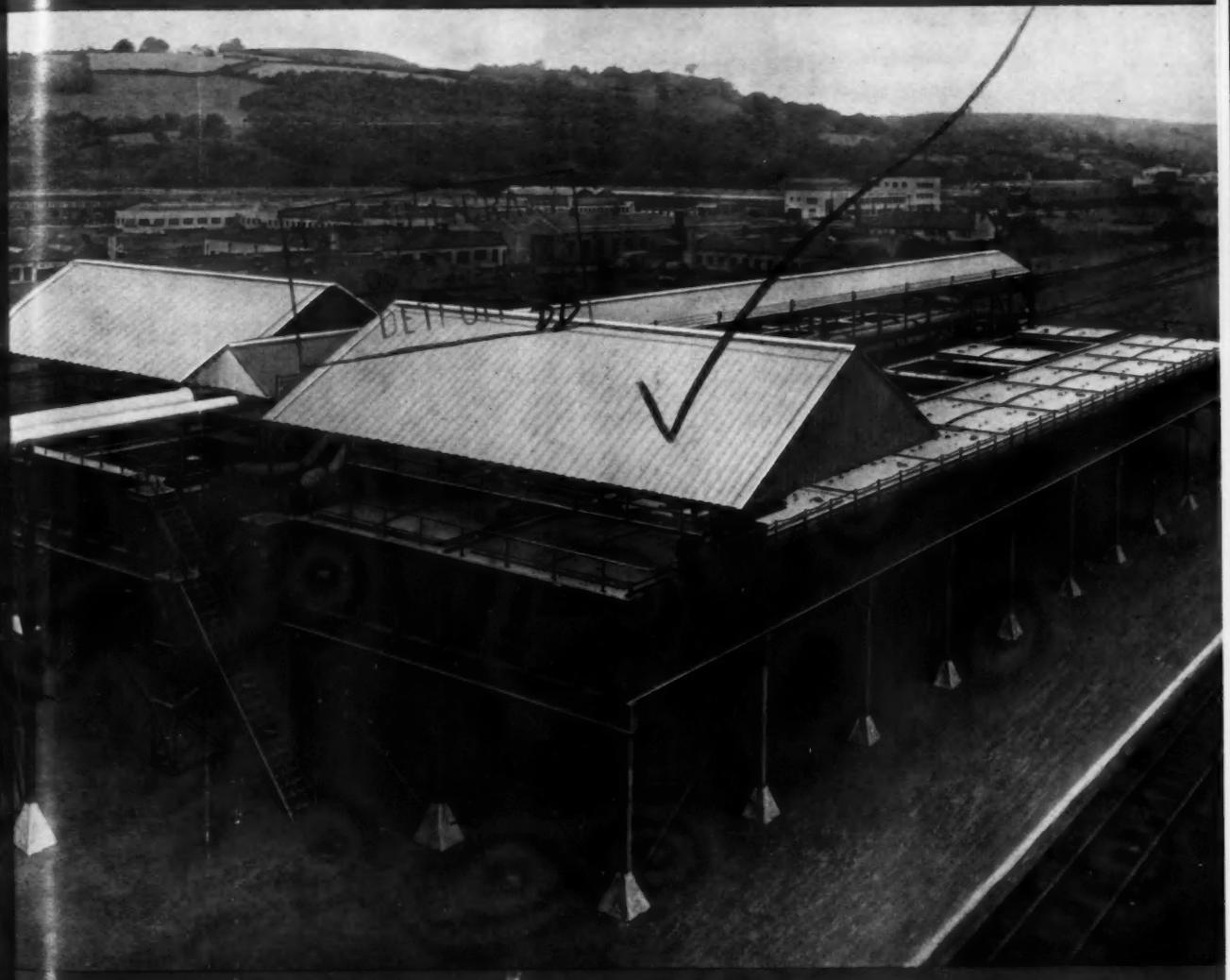

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OXIDE HOISTS AND COVER LIFTING APPARATUS.

FOR THE NATIONAL COAL BOARD, NANTGARW, SOUTH WALES.

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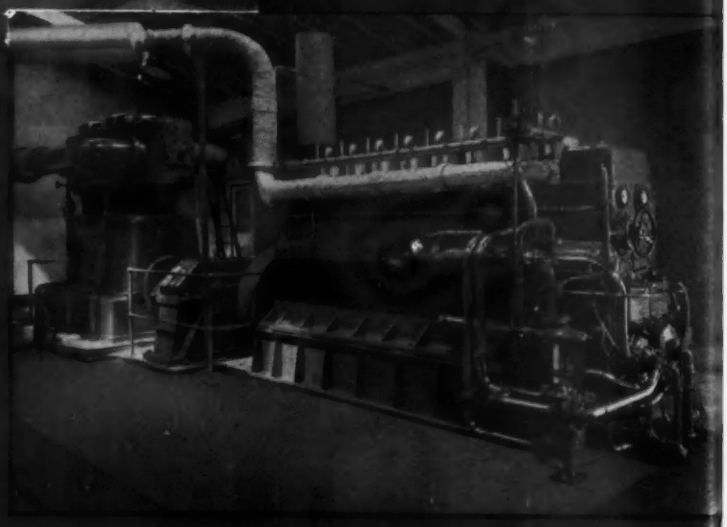
Illustrations by courtesy of the South Western Gas Board and Blackstone & Co., Ltd.

A Diesel Engine driven Compressing Plant which has been specially designed in co-operation with the South Western Gas Board and Blackstone & Co., Ltd. who supplied the Diesel Engine.

This plant is to set up a standby to an Electrically Driven Set, and automatically comes into operation in the event of an electric failure, thus maintaining the distribution of High Pressure Gas.



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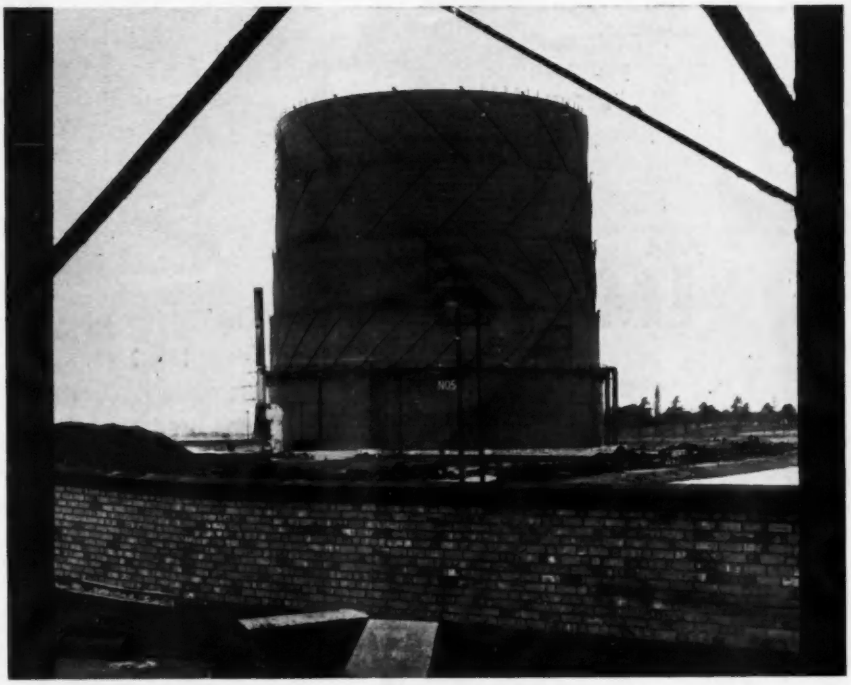

A distinctive modern 4-lift spirally-guided gasholder and steel tank by R. & J. D. Ltd.
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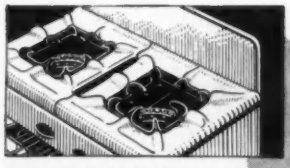

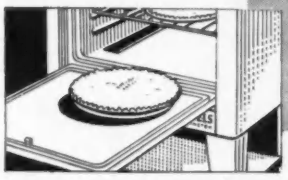

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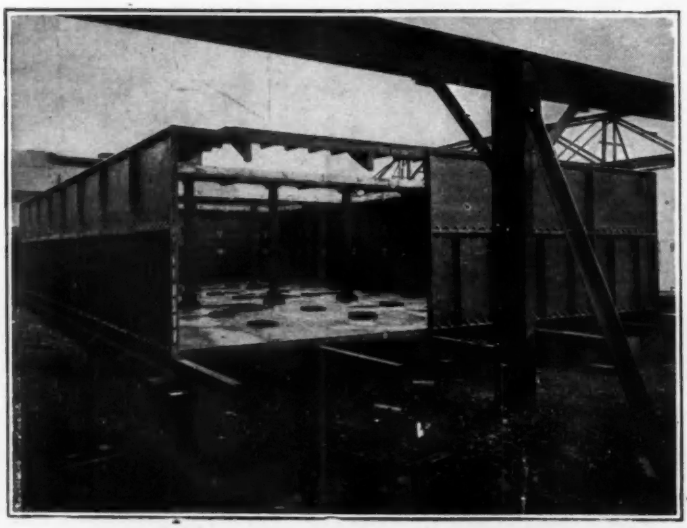

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Photographs by courtesy of Eastern Gas Board.

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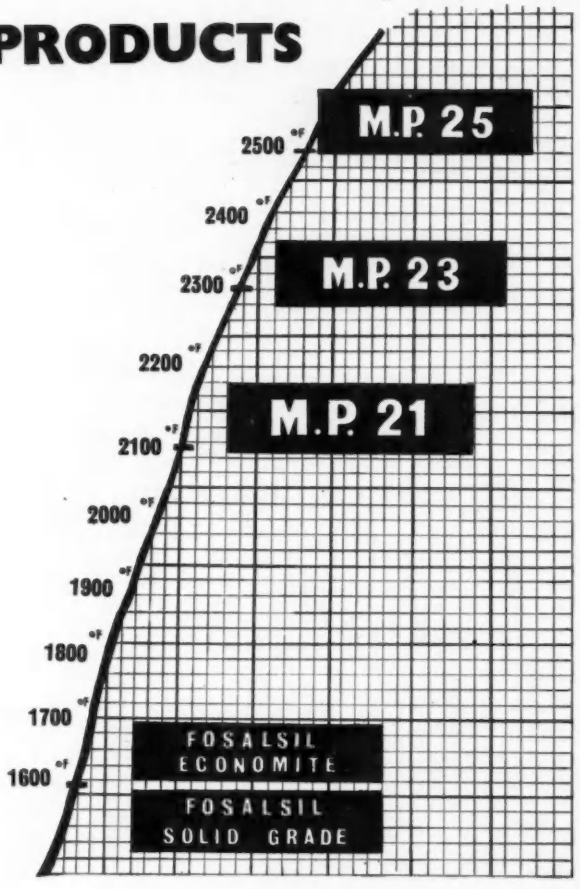

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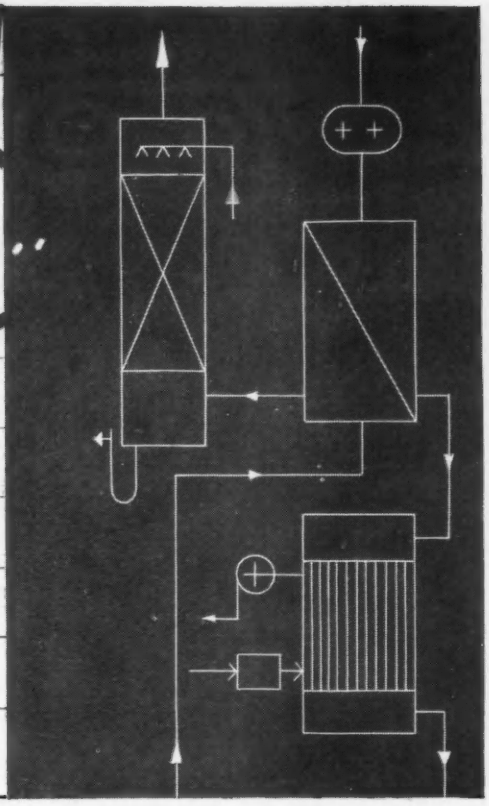

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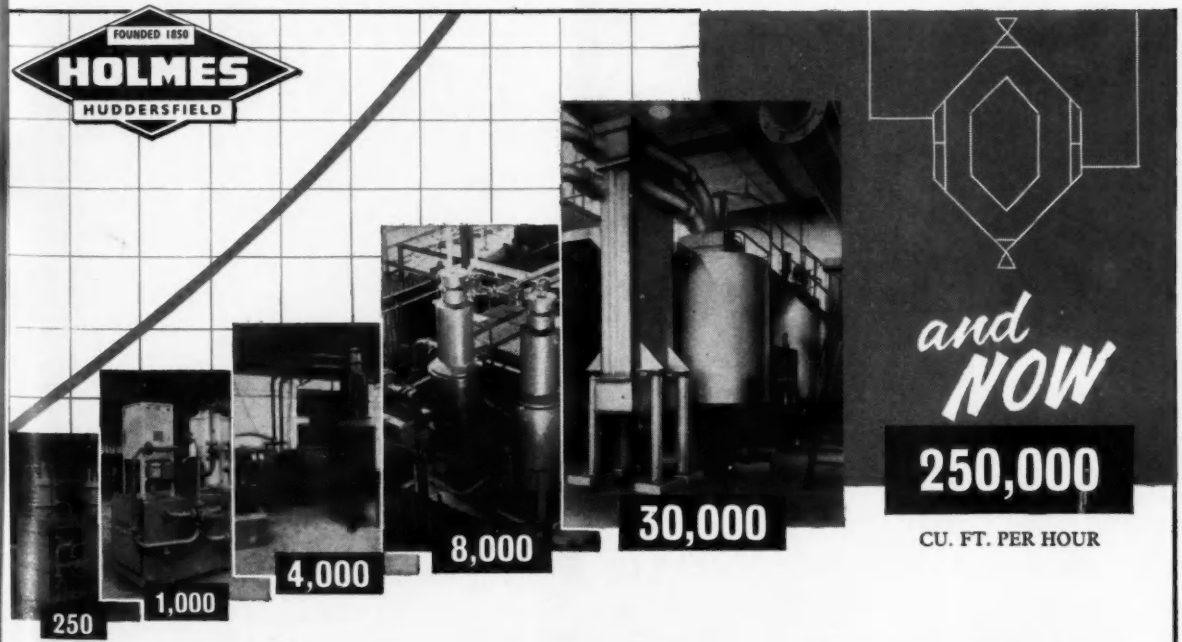

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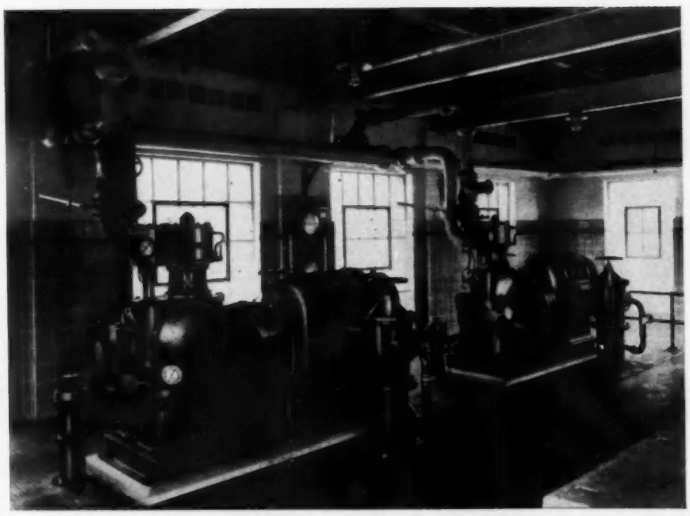

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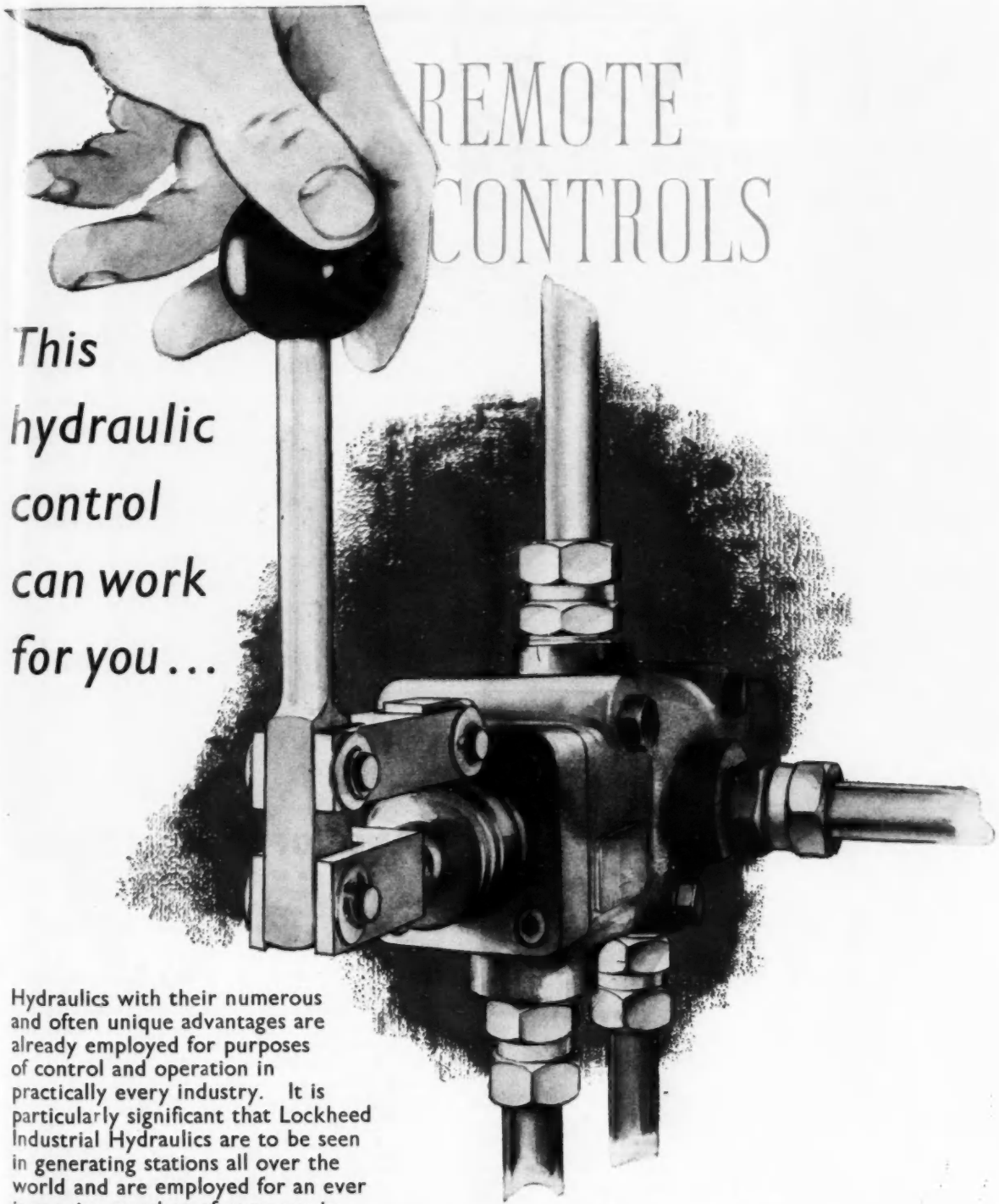

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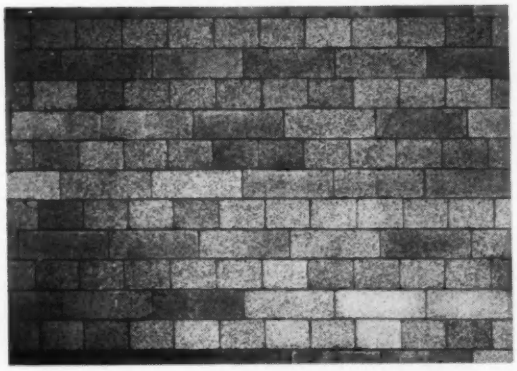

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625	25	32	6	11·5
650	50	61	6	13
1215	15	38	12	18·25
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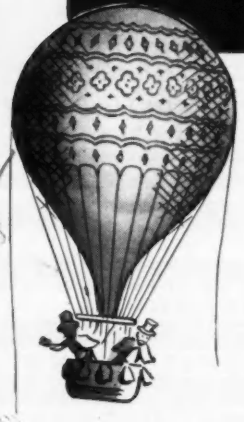

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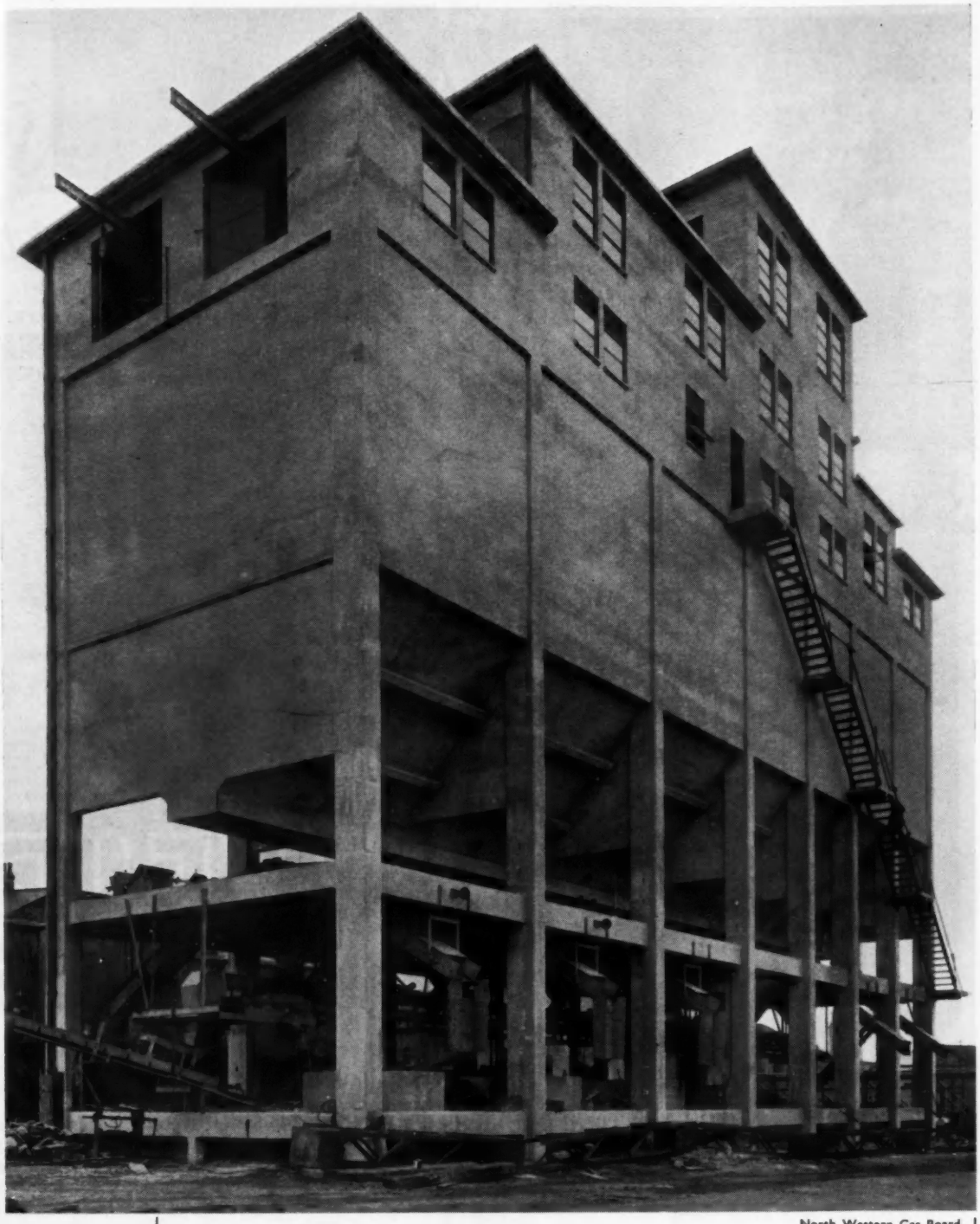

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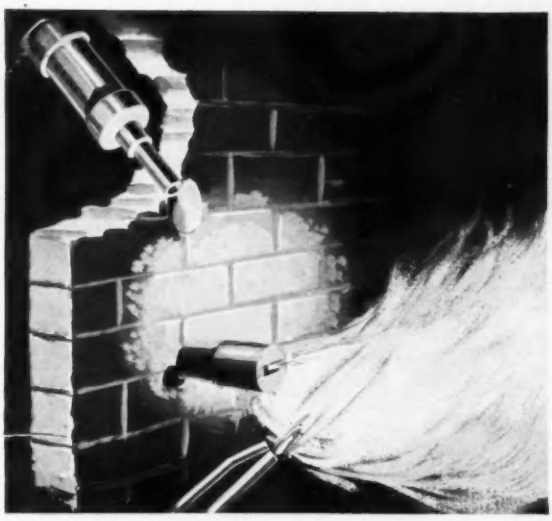

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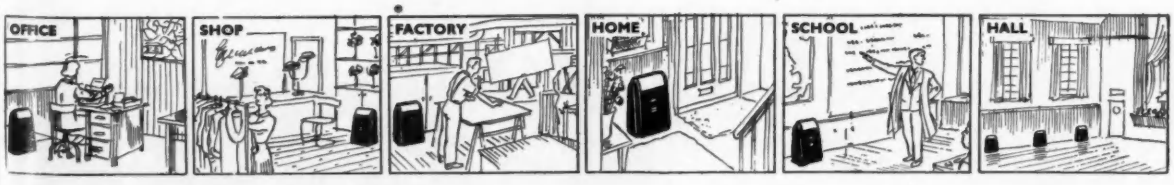

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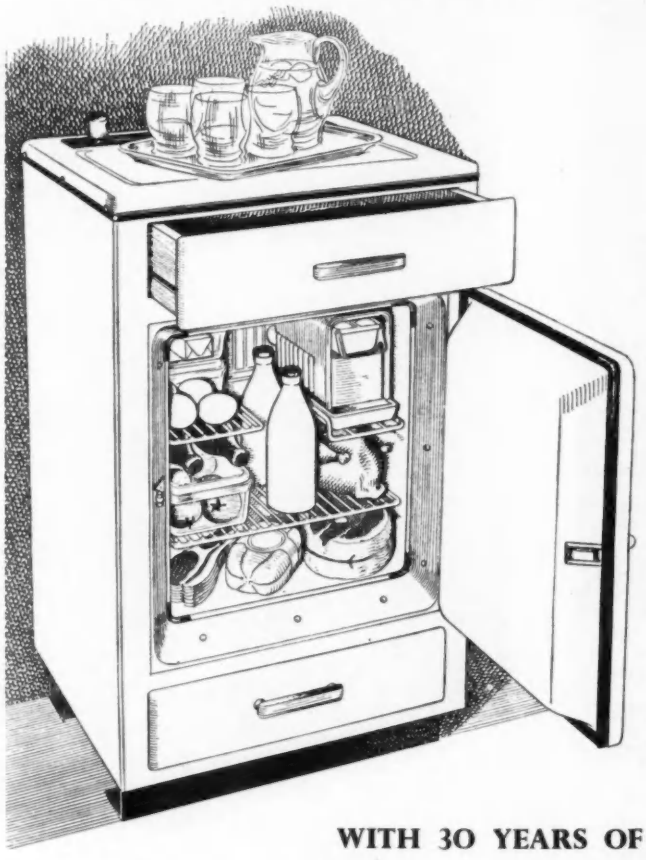
MR. THERM SAYS—

There's an 'R' in the month!



. . . **'R'** for *Refrigerator* sales *every* month . . . yet, once upon a time, months with an **'R'** were thought out of season for selling refrigerators.

For you, Electrolux educates the public that it's 'always summer in the kitchen'. For you, Electrolux tells the people that food should be kept 'cool, clean and covered, all the year round'.

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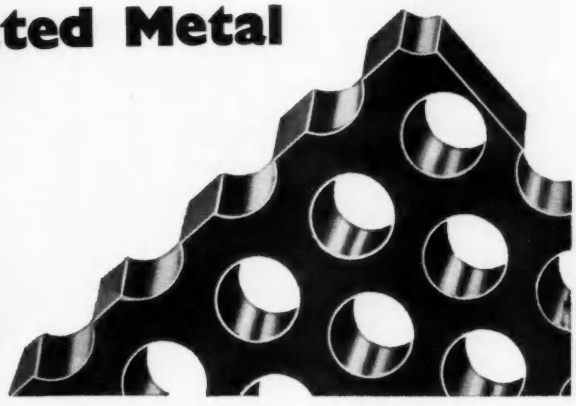

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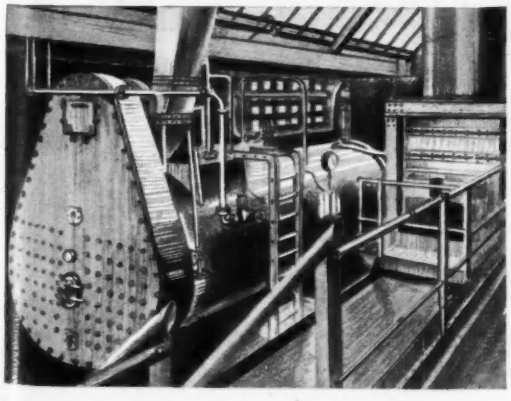

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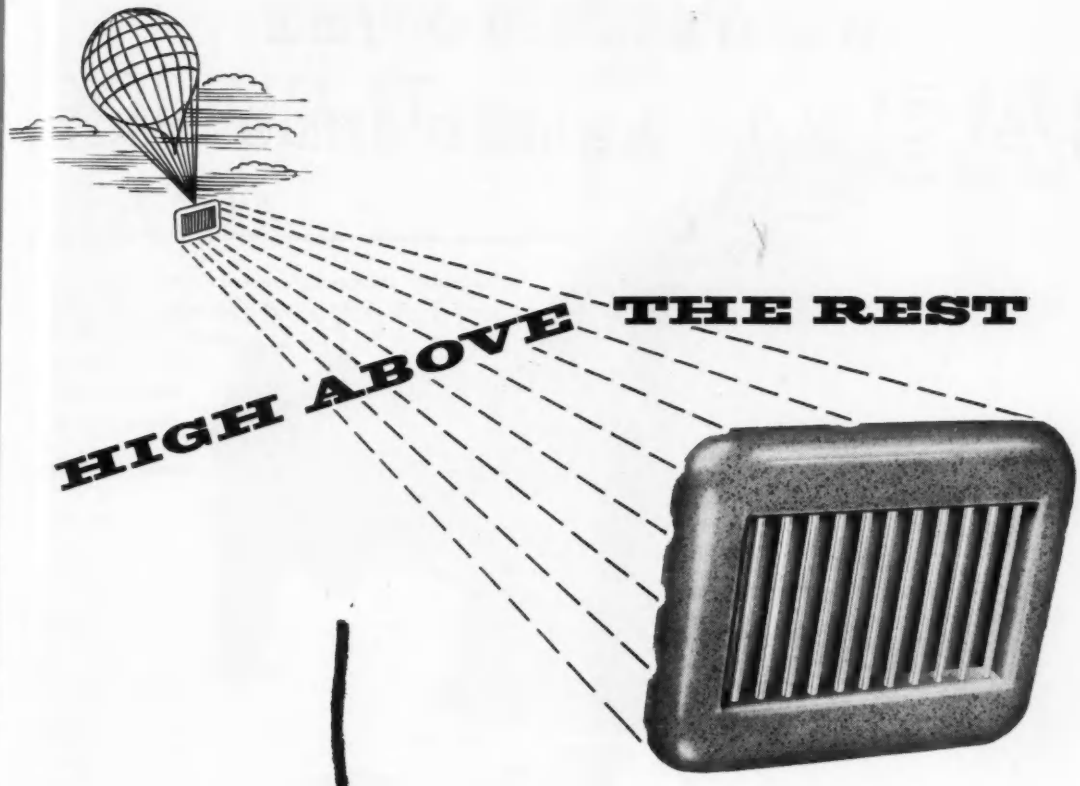

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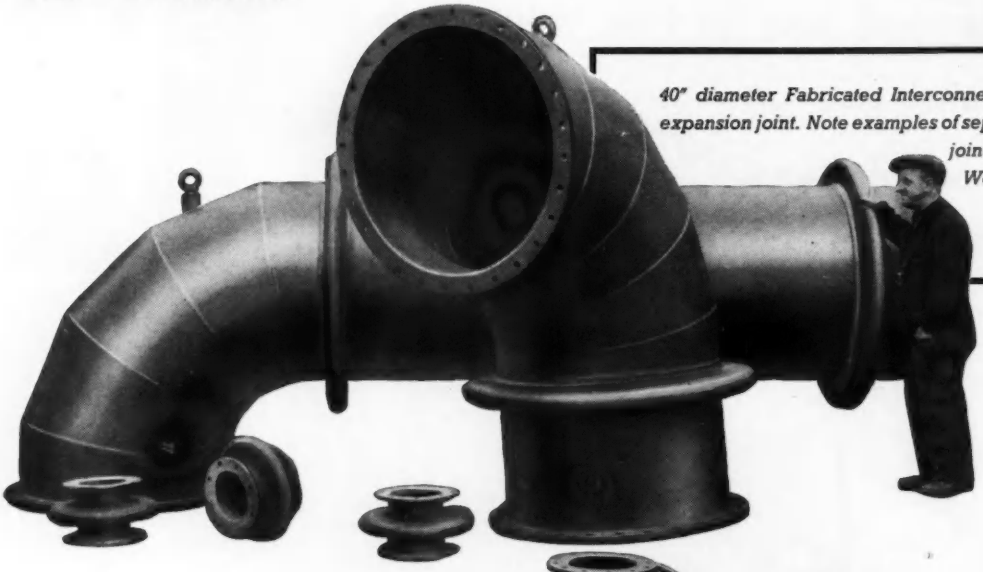

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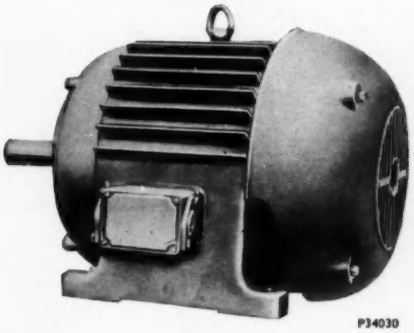

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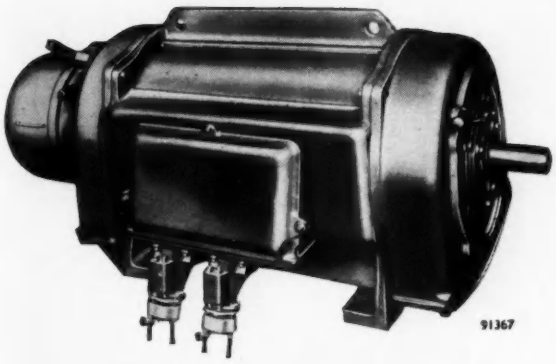

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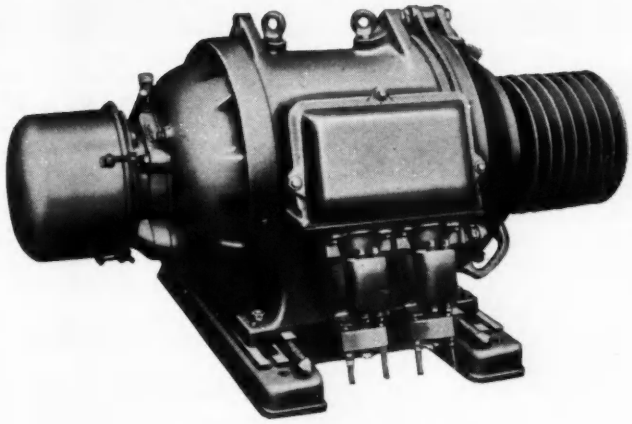

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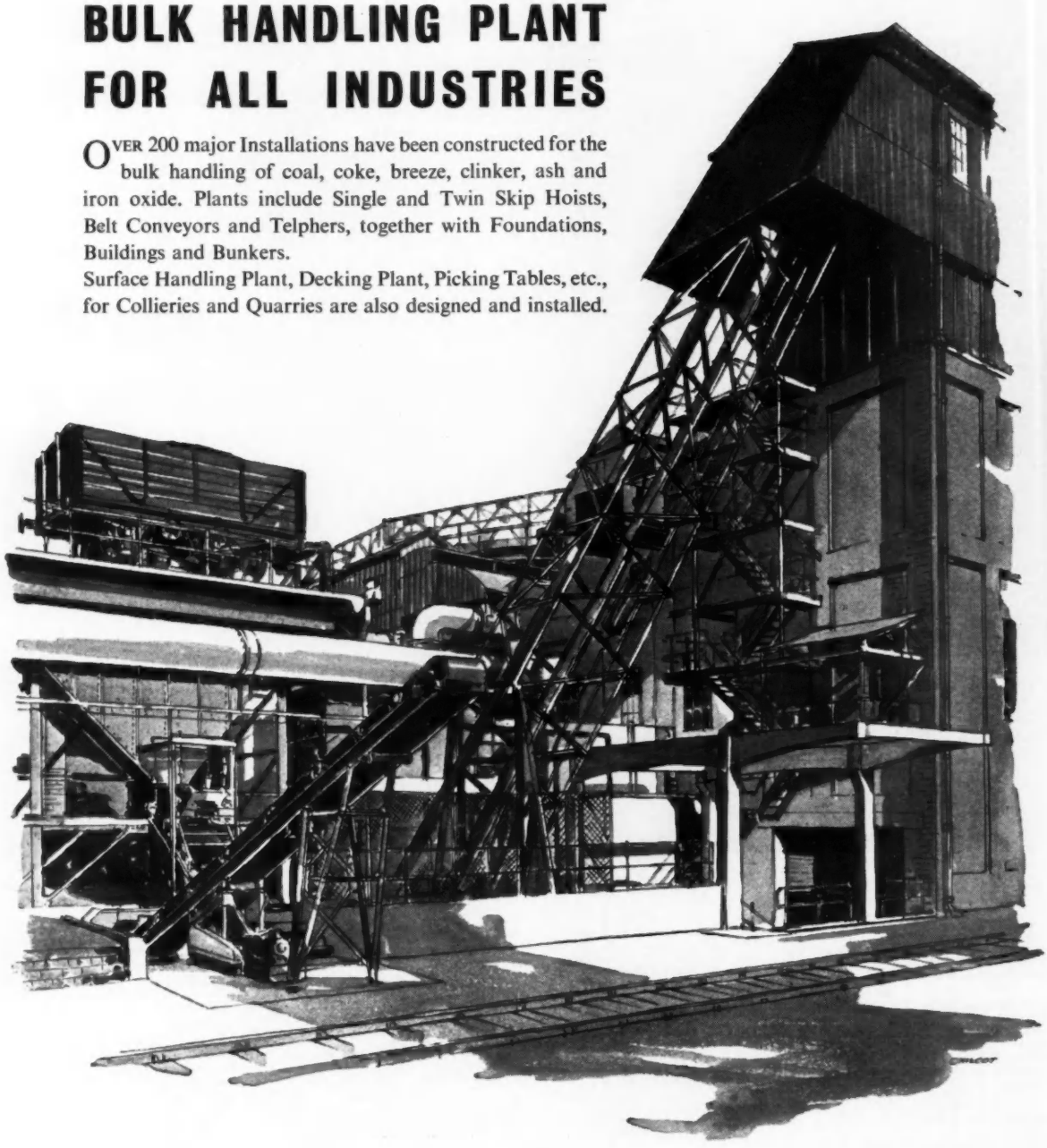

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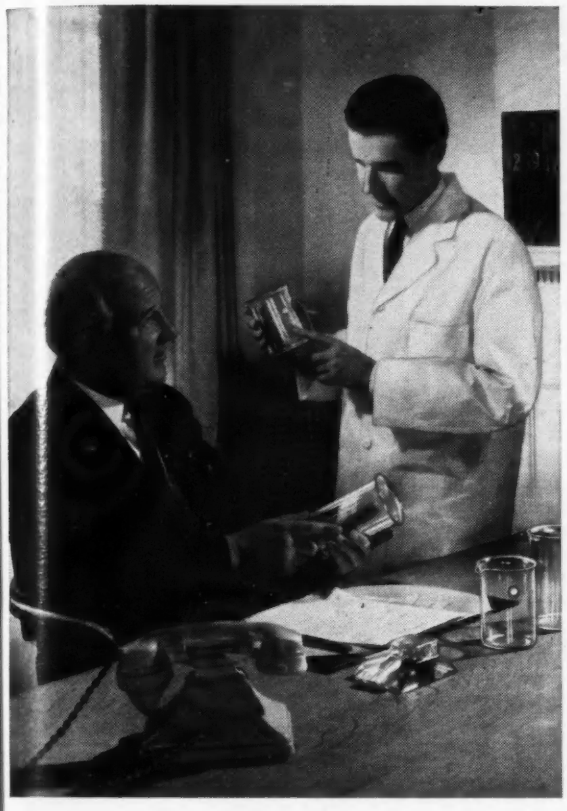

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106th YEAR

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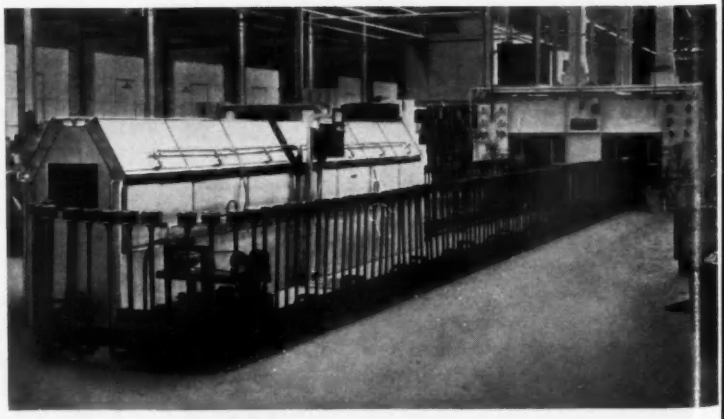

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VOLUME 280 . No. 4767. OCTOBER 13, 1954. 106th YEAR

5 Years under Nationalisation

ONCE again we have come to that time of year when the gas industry takes stock of itself, looking back over the past year's work and achievement, progress and disappointments. For yesterday, the report and statement of accounts of the Gas Council and the 12 area boards for the year ended March 31, 1954, were released, together with the report of the Minister of Fuel and Power. In this connection it is gratifying to note that the date of publication of these reports has been still further advanced towards the end of the financial year to which the reports refer; this closing of the gap is a sure indication that the industry is well into its organisational stride and that the flow of information from the periphery to the centre has reached a high degree of efficiency. The report of the Gas Council is summarised in later pages of this issue of the 'JOURNAL,' and we propose to examine the reports of the area boards themselves in due course. In many respects the year under review is considered the most satisfying since vesting date, and it is to be gathered that the happy state of affairs is due chiefly to the fact that supplies, other than coal, have been more plentiful, that boards have been granted greater freedom in commercial activities and that they have been able to make better progress with long term plans. One of the most important events during the past year has been the submission to the Minister of Fuel, by the area boards, of programmes of capital development for the period up to March 31, 1960, which programmes were endorsed by the Gas Council. Even more important, however, was the Minister's general approval of these plans and the provision of the means whereby they could be carried out—i.e., the Gas and Electricity (Borrowing Powers) Act, which increases the industry's borrowing powers from £250 million to £450 million. Still considering the financial angle for the moment, it was good to read that the industry as a whole had a net surplus, after transfers to and from taxation reserves, of £2,111,536 in the fifth year since nationalisation. This is slightly less than the surplus for the previous year (£2,313,000), but still a very comforting figure and also a tribute to the efficiency and economy with which the industry is being run. An examination of the detailed financial results of the area boards is always particularly rewarding, as it gives one a feeling of the ups and downs which affect the boards in the continually changing circumstances of present day affairs. Of the twelve boards, nine show a net surplus ranging from £992,029 for the North Western Board to £7,426 for the Southern Board, while the three boards which are in 'the red' are Scottish (£−167,718), Eastern (−£17,322) and South Eastern (−£145,983). These figures will be more closely examined when we come to a further study of the area board reports.

Despite the rosy picture painted by the earlier remark that this has been the most satisfactory year since vesting date, nevertheless there remained one substantial fly in the ointment—coal. Supplies and prices of this, the basic raw material of the industry, have continued to cause the Gas Council and the Boards grave concern. The quantities provisionally allocated to the gas industry for delivery in both the summer and winter periods were below the industry's estimated requirements and were themselves further reduced, necessitating the increased use of water gas, which is more expensive to produce and also, since it requires coke for the process, diminishes the quantity of coke available for sale. The Council felt it necessary to represent to the Minister the likely effects of the reduction in the quantity of coal both on gas supplies and on production costs, and although, as it happened, the industry was able to get through the generally mild winter alright, neither initial stocks nor subsequent deliveries would have been sufficient for a long hard winter. This re-emphasises the precarious nature of the industry's hold on events, for had last winter been of the 1946-47 variety the picture might easily have been sombre indeed. And quite apart from the difficulty in obtaining the quantity of coal which it required, the industry had to face another quota of price increases. Although there was no actual increase in the pithead price of coal during the year March 31, 1953—March 31, 1954, there was what amounted to practically the same thing—i.e., the full effect of the general 10% increase which was applied from March 2, 1953, becoming felt. The result was that, together with increases in freight charges, the industry's coal bill, including handling charges, was nearly £30 million more than it would have been at prices ruling in 1949-50. Another advance in pithead prices, averaging 3s. per ton, which took effect from May 3, 1954, will still further increase the cost of coal in 1954-55. No matter how optimistic one may be by nature, one cannot blink the fact that the prospects for increased or

cheaper coal supplies seem conspicuous by their absence. It is not surprising, therefore, that the Gas Council has pressed ahead during the past year with its plans for finding means by which the industry's requirements of high priced carbonisation coal and its dependence on such coal might be reduced. Among the major research and development projects designed for this purpose and in hand with the Gas Council, are those concerning improvements in the technique of carbonising by orthodox methods and the spreading of these improvements over wider areas by integration, plant and processes for the gasification of more weakly caking coals which are in better supply, the production of gas from sources other than coal, the search for natural gas and finally efforts to improve the efficiency with which gas and coke are used. Clearly the Gas Council is not content to take the coal position lying down nor is it satisfied with bewailing its lot—it is making a good best of a bad job in its endeavours to find alternatives.

Of the methods for augmenting gas supplies which we have just mentioned, the one which fires the imagination most of all is, of course, the search for natural gas. The Gas Council in devoting £1 million to a five year search for this gas has taken the plunge into unorthodoxy with a resounding splash, and we think with good reason. For the time is long past when any narrow or partial solution to the problem of coal supplies could be of service; and someone, somewhere, had to take the bold decision whether or not to 'have a go' at natural gas. It is true that a million pounds is a lot of money to spend on looking for it, but then the rewards from the search might well be commensurately large—and completely transform the situation. Anyway, the die is cast and work is well under way; deep drilling has taken place at Cousland, Midlothian, and is now proceeding at Crowborough, Sussex, where 'shows' of gas have been obtained at several levels. Preliminary survey work has been undertaken in the East Riding of Yorkshire and Lincolnshire, to determine the most favourable areas for further investigation. Perhaps by the time next year's reports and accounts are issued, there may be some interesting developments upon which to comment.

On the manufacturing side of the industry, the figures relating to production capacity and efficiency continue to be encouraging. There was an increase of 1.4% in manufacturing capacity, bringing the total to 11,552,110 therms a day; and important new works brought into commission during the year included that at Swan Village, near Birmingham, of the West Midlands Gas Board and that of the Wales Board at Maelor, near Wrexham. Since 1948 the efficiency of production at gasworks has increased from 71.0% to 75.2% and this result has been achieved by improved methods of working, by the replacement of obsolete plant and the closing down of uneconomic works. It is significant that if the output of gas and products in 1953-54 had been produced at the 1948 level of efficiency, the equivalent of another 1.65 million tons of coal would have been required. Let no one say that the gas industry has not done what it could to save coal!

Coal used in gas-making totalled 27,091,000 tons as against 27,590,000 tons last year, and it is reported that the average yield of gas per ton of coal carbonised was 74.5 therms compared with 74.0 therms last year. This is further evidence of the economies which the industry has made in its manufacturing methods and, in view of the continued progress made in the 'therms per ton' over the past few years, it is a challenge to it to go one better next year! Tied up with the concentration of production in the larger and more economic stations has been the development of the gas 'grid' system by means of which it has been possible to feed supplies of gas to those areas formerly covered by the smaller, less economic works. The total length of mains in use by the end of the financial year was 83,427 miles, an increase of over 2,300 during the year. An interesting corollary to the notes given on the industry's increased capacity is provided by the fact that in the very cold snap at the end of last January and the beginning of February, the industry supplied 11% more gas than it had ever supplied in a week of any previous year. Even though this occurred during the early part of the year, it still gives one a feeling of satisfaction that the industry can rise so nobly to an occasion.

Sales of gas during the year totalled 2,513 million therms as against 2,524 million therms for the year 1952-53, and this decrease is attributed mainly to the higher average temperatures obtaining, particularly in the later months of 1953. This drop in sales chiefly affected domestic and commercial consumers, as the industrial use of gas increased by 3%. As the industrial load now accounts for more than a quarter of the total sales of gas, and as the number of applications of gas to industrial processes is steadily growing, the industry will be able to look more and more to this load as a steady source of revenue.

On the coke and by-product side, the impression one gets is more mixed. Coke and breeze produced a greater net income than in the previous year (£56.1 million against £54.5 million), while tar, benzole and other products brought in £11.2 million compared with £12.3 million in 1953. The demand for chemical products improved towards the end of 1953, but prices were, on the whole, lower—sales totalled 1,445,000 tons of crude tar, 82,700 tons of sulphate of ammonia, 266,600 tons of spent oxide, and the quantity of crude benzole extracted was 27,772,000 gallons. An increased quantity of ammoniacal liquor was sold for direct application to the land as a fertiliser, and encouraging trials have been carried out for its use in Scotland.

Despite the great strides which the gas industry has made in the improvement of manufacturing methods, in this increase of its gas-making efficiency and in the better coverage which it has obtained by its mainlaying programme—it has not been able to secure the benefits in increased business which these improvements should have brought. This state of affairs was largely due to the restrictions on the hire-purchase of appliances, to the restrictions on publicity and last, but by no means least, to the crushing burden of the purchase tax on appliances. The first of these was removed during the year for water heaters and has since been removed from all appliances, while the restriction on publicity was also lifted early in the year. Unfortunately, the purchase tax remains where it has been since April, 1953, namely, at 50%, except in the case of manually-operated washing machines. One of the most important of gas appliances, the water heater, is

thus condemned to continue its lonely battle against the overwhelming odds of a 50% tax. In view of the fact that it is one of the most efficient of water heating devices, from a thermal point of view, and that its use can contribute materially to coal saving, quite apart from its convenience in the home, it does seem rather strange that it has been so systematically sabotaged by Government decree. However, consolation can be taken from the figures quoted in the Gas Council's report for the number of water heaters sold during the last three years. In the year ended March 31, 1952, 55,044 were sold on hire-purchase terms; in the following year only 26,465, and in the year ended March 31, 1954, 99,469. These figures are proof, if proof be needed, that the public want gas water heaters and will buy them if they can afford them, and the Gas Council has made representations for the removal of all purchase tax on gas appliances, as it is clear that a 50% tax on water heaters and space heaters raises their price beyond the means of many people. It is to be hoped that the light will dawn upon the official mind before the next year's reports are published.

The number of people employed in the gas industry on March 31, 1954, was 145,031, and this represents a reduction of 2,430, due to the progress made by the area boards with their plans for centralising plant and staff. While there are still from time to time shortages of skilled and unskilled personnel in some parts of the country, the labour position was on the whole easier during the year. In the Midlands, where a shortage of labour is common to other industries, the rate of turnover remains high. The boards' apprenticeship schemes are attracting a promising type of recruit to the industry. As a result of negotiations on claims for increases of wages and salaries, settlements were reached at an estimated annual cost to the industry of £1,900,000. Much importance is attached by the Gas Council and area boards to training in management, and it is hoped to arrange a series of courses in management, similar to the experimental courses held at the Brooklands County Technical College, Weybridge, Surrey, during the past two years.

A final word about the cost of gas. The average income per therm of gas sold was 16.39d. as compared with 15.73d. last year, but seven boards, by reason of some revisions made during 1952-53, were able to maintain their prices unchanged during the year; some boards have, indeed, been able to keep them unchanged since early 1952, in spite of heavy increases in the cost of coal, transport, wages and salaries. By improvements in the efficiency of production and by administrative economies, all boards have succeeded in passing on to consumers only part of their increased costs. So, by and large, the consumers have not had to dip their hands in their pockets quite so deeply for their gas as for some of the other necessities of life, and this is a measure of the success with which the industry has surmounted the year 1953-54. Taken altogether it has been a year of solid achievement, also one in which the easing of restrictions on supplies (except coal) and on appliances has opened a wider prospect for future developments.

(*Due to the late receipt of the Gas Council and area board reports the Personal column, Correspondence and Diary will be found on Page 133.*)

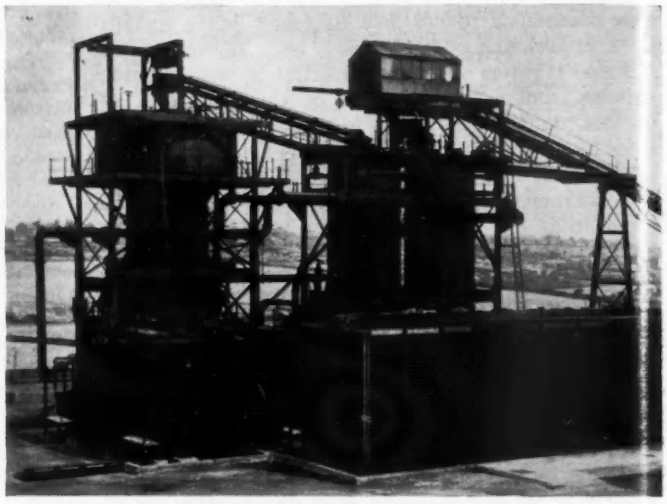
HIGHER EDUCATION STANDARDS

The report of the Board of Examiners on the 1953-54 examinations of the Institution of Gas Engineers is the first to appear under the new regulations. It is shorter than usual; it is also more significant in view of the higher standards now in being for qualification for Associate Membership of the Institution. The Ordinary and Higher Grade examinations ceased in 1953, and it is not anticipated that, at any rate for some years, the number of candidates for the examination for Associate Membership will reach the figures characteristic of the last few Higher Grade examinations, when, in fact, quality lagged behind quantity. Reasons for the change are not difficult to find. The standard of the Associate Membership examination is beyond the capacity of many who attempted the Higher Grade Certificate. By far the larger proportion of candidates for the examination are studying by means of national certificate courses and will not be ready to sit for the I.G.E. examinations for a year or two. A larger number of graduates with academic qualifications which are themselves sufficient to satisfy the relevant clause of the by-laws relating to Associate Membership are being recruited to the industry. The standard is on the upgrade, and there is no cause for anxiety concerning the small number of entries during the current year, when, according to the report of the examiners, 'the general standard was not unsatisfactory.' It is evident from the report, however, that cultivation of what we might term the 'examination technique' by candidates—the ability to interpret questions and answer them clearly in a reasoned and logical way—would stand them in good stead. It would also, of course, greatly ease the task of the examiners in deciding whether or not the candidate really understands his subject. Examinations may not be the perfect means for assessing a man's knowledge but they are the only workable means at present.

MISS BURGESS'S SOIREE

On the eve of the memorial lecture to William Murdoch at the Royal Institution, Miss Marjorie Lovell Burgess, Lectures Officer to the Gas Council, made her own contribution to the memory of the great pioneer. At Piccadilly's Burlington House she gave to the Society of Engineers an extremely well-integrated picture of 'Murdoch's Influence on the Modern World.' Proud guests of Miss Burgess were some of Murdoch's relatives. There was Mr. William Murdock, the great great great grandson (he spells his name with a 'k', a form his ancestor adopted when he came south), who is nothing to do with engineering. He met for the first time Mrs. Gertie Wandel, a member of the Danish Parliament, who had married a great great grandson—the late Helge Wandel. Illustrating her lecture with lantern slides, Miss Burgess concentrated on looking ahead: 'In the year 2004 A.D.,' she said, 'the keystone of efficient and successful communities all over the world will be the fuel and power industries. Among them will be the gas industry with—as in the past—first-class gas engineers, men of integrity, devoted to duty, worthy successors of William Murdoch.' She presented Murdoch as a real man; a man who thrashed a large bullying Cornish mine captain; a modest man who left others to exploit his ideas; a man in advance of his time. Here was an 18th century inventor who thought of steam power in relation to travel by road and sea and had all manner of ideas more creditable to a 20th century citizen. Miss Burgess's tribute to Murdoch the man and Murdoch the influence on the modern world must have provided a valuable contribution to the records of the Society of Engineers and certainly provided a memorable evening for those who listened to her.

'REXCO' *fuel plant extensions*



On October 6 a distinguished company of people connected with the coal industry or interested in the production of solid smokeless fuel assembled at the Mansfield, Notts, plant of Midland Rexco Limited for an interesting ceremony. This was the inauguration by Lord Brabazon of Tara, M.C., P.C., of a new retort for the manufacture of the well-known 'Rexco' smokeless fuel. Present at the ceremony were representatives of the Ministry of Fuel and Power, the National Coal Board, the coal merchants, research organisations connected with solid smokeless fuels, the contractors who built the plant and various other bodies.

In the postwar years the demand for 'Rexco' and other solid smokeless fuels, has increased by leaps and bounds, and has shown unmistakable signs of so continuing. With this in mind the National Carbonising Co., Ltd., decided recently to increase the output of the plant operated by its subsidiary, Midland Rexco, Ltd., at Mansfield. Formerly this plant had consisted of two retorts each 24 ft. high, 11 ft. in diameter and with a capacity of 34 tons of coal. The carbonising plant is situated in close proximity to the Mansfield Colliery of the East Midlands Division of the National Coal Board, and this arrangement permits the delivery of coal direct from the colliery wagons to the storage bunkers of the Midland Rexco Company. The new retort has an improved method for the combustion of gas prior to circulation through the charge; and this improvement has reduced the period required for carbonisation with a resultant increase in throughput from 45 to 58 tons of coal per day per retort.

The new retort, which was built and installed by Newton Chambers & Co., Ltd., has the same main internal dimensions as the original vessels which have been successfully worked for a number of years, but it incorporates some modifications in design which are the result of the experience gained from past operations. A major innovation is the complete redesigning of the combustion chamber at the top of the retort in order that heating gas of a uniform and controlled temperature may be obtained.

Important advantages accrue from this new arrangement—particularly in the accurate measurement of the temperature of the heating gases before the entry into the charge, in the provision of refined automatic means for maintaining the desired temperature, and in the better control of combustion generally.

At the inaugural ceremony, Lord Brabazon, who has for many years taken a keen interest in solid smokeless fuels, pressed a button and so actuated a hydraulic ram which caused the withdrawal of the grate from underneath the new retort. This enabled the visitors to see the discharge of a retort load of 'Rexco' on to the ramp and its subsequent delivery via belt conveyors to the grading plant. They were then conducted round the remainder of the plant by Colonel A. Vaughan-Cowell, Managing Director of the National Carbonising Co., Ltd., and Mr. J. A. Brown, Managing Director of Midland Rexco, Ltd. A luncheon at the White Post Inn followed the tour of the plant.

Inaugural Speeches

In introducing the guest of honour, Lord Brabazon of Tara, the Chairman, Lt.-Col. A. Vaughan-Cowell, said that he was very grateful to Lord Brabazon for attending to perform the ceremony of opening the new extension to the 'Rexco' plant. His great reputation as a public man and a sportsman was well known to everyone, but his services to industry were not perhaps quite so well known. He had been a director of the great Associated Equipment Company; a director of the Kodak Company; a director of engineering companies and of Thomas Tilling, also of E.M.I. But what was of particular interest was that he was one of the pioneers of the low temperature carbonisation of coal. Some 30 years' ago, appreciating the fact that it was a crime to burn coal in the raw state, and that it should be used to produce secondary products of greater value, he had the courage of his convictions to resign his post as an Assistant Minister, and put his energy into the prosecution of that idea.

In his speech Lord Brabazon said that Colonel Cowell has given a glimpse of some of the things that had occupied him in the past, but that it was not for that reason that he had come to the ceremony. He had attended to pay tribute publicly to a very remarkable man, and a very old friend—Arthur Vaughan-Cowell. He was associated with him in the old days of solid smokeless fuel production, and very exciting days they were. They had high hopes and they worked very hard, but every single thing that could go wrong went wrong. However, he stuck to the ship to the very end, although the end was a long interrogation in Carey Street. Later he went into other things, but he never lost his faith in low temperature carbonisation.

Lord Brabazon said that he wondered very much if things had changed over the many years that had elapsed, as he had not been in close contact with recent developments. In those earlier days there was the great Coalite Company dealing with coke and coal, and in charge of it then was Colonel Bristow, now there was Commander Buist. They were keen rivals, but they were never anything but helpful the whole time—always friendly, co-operative and inspiring.

In the world today, 'where everything that is nice and good is either illegal, immoral, or fattening,' Lord Brabazon

said that he refused to be deprived of some of the things that were dear to his heart, and one of them was the open fire. 'In the evening of the day, and indeed in the evening of one's life, when the fever of activity has gone down slightly, I know nothing more agreeable than being in one's own home, surrounded by those you love—with possibly a dog on your lap—to laze and do nothing but gaze into the fire.'

He said that he knew quite well that one should not do this. He had been told that it is a wasteful method of getting heat and that our coal will run out in about two hundred years. These things, however, did not interest him. He had taken part in two wars; he was taxed nearly 100% for posterity, and thought that if posterity could not look after itself and keep itself warm in two hundred years' time, then it could freeze!

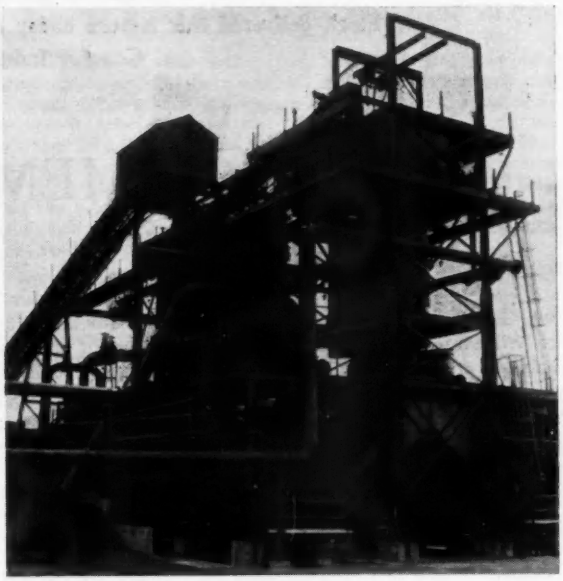
Meanwhile, he said, the problem that was before us was to get the utmost wealth that we could out of our minerals. Once in his life he was concerned with electricity and was always amused that people spoke about electricity in a way that implied there should be a cheap and abundant supply. Coal has never been mentioned in those terms—certainly not cheap, nor was there abundance at the present moment. Coking coal was a 'gold mine,' but the majority of our coal was not coking coal. Accordingly what were we to do with it if we were not to burn it in the old-fashioned smokey way? After the efforts of so many years, after so many failures, so much money spent, it looked to him that Vaughan-Cowell's 'Rexco' process had come along and was to supply us with the ideal fuel, which was also a valuable contribution to the abolition of smoke.

Concluding, Lord Brabazon remarked that the end of the story is not yet told and with regard to tar-oil is not yet known. Also that, in the plant, the 30 therms of gas produced per ton of coal that are at present wasted, will be harnessed later on.

He thought that the visitors must have been impressed in that the capital costs were so very small, the plant so easy to erect and occupying little space; that there were no moving parts, and that the plant needed little attention by skilled hands. Most important, he considered, was the fact that the process is paying. In his final words, Lord Brabazon paid tribute to the work of Colonel Vaughan-Cowell and wished him good luck with the present plant.

After thanking Lord Brabazon for his generous tribute, Colonel Vaughan Cowell said that he could not possibly have succeeded in bringing the 'Rexco' process to the present successful stage without the theoretical knowledge, practical experience, resource and outstanding ability of Mr. J. Anderson Brown, the Managing Director of Midland Rexco, Ltd. As far as his company was concerned it had had co-operation and assistance from the National Coal Board in London, and more particularly from the East Midlands Division and the No. 3 Area, where it operates, and he gratefully acknowledged the assistance and help he had received in formulating the erection of a second plant.

Lt. Colonel A. Vaughan-Cowell, Lord Brabazon, and Mr. J. A. Brown. (Photo by courtesy of the Nottingham Evening News.)



New retort in foreground, showing grate partly withdrawn.

Colonel Vaughan Cowell continued, 'A great section of the coal industry is represented by the thousands of coal merchants, and they also have their difficulties. They are in rather a peculiar position, as they all sell the same fuels at the same prices, and therefore competition between them is limited to the service they give customers. There is only one way in which a coal merchant can increase his business, and that is by increasing the number of his customers, and that means taking them away from someone else. I believe, with this fact in view, that the rationing of coal could be abolished without any effect on the consumer.

A word as to the marketing of our 'Rexco'; the price is controlled at the plant, and once it is put into the truck we have no further control over the product or its price to the public; that is fixed by the local Fuel Overseers. The coal merchant buying from us at the controlled price free on rail, is permitted to add the railway freight to his depot, and for his expenses and profit a fixed figure as agreed by the Coal Merchants' Federation and the Ministry. He also therefore has nothing to say in the retail price. The coal merchant has a very difficult job to perform with the shortage of every sort of fuel, and the present arrangements seem to be rather hard on him, for his margin is fixed; his profit is 2s. 3d. per ton on every ton sold, whether it is a high or a low-priced fuel, not a very satisfactory situation.

We occasionally hear complaints that the price of smokeless fuel is too high; this again is almost entirely out of our control. Coal represents 78% of our cost of production, labour another 12% and power from the Electricity Board another 2%, so that 92% of our total cost of production is entirely out of our control, and out of the remaining 8% we have to find rent, rates, insurance, depreciation and the costs of administration. Our treatment of coal merely extracts from it some of those constituents which either do not give heat, or are surplus, and that is principally why 'Rexco' under independent tests gives 29% more radiant heat than the coal from which it is produced.'

AMONG THOSE PRESENT AT THE INAUGURATION.

Rt. Hon. Lord Brabazon of Tara, M.C., P.C.; Lt.-Col. A. Vaughan-Cowell, F.I.I.A.; Sir J. D. Ramsay, Bt., M.V.O., Director; J. A. Brown, A.I.MECH.E., Director; J. Darwen, Director; F. H. Strouvelle, F.C.I.S., Director; Geoffrey Cooper, Director; Hon. E. D. G. Davies, Director; N. Fricker, O.B.E., Marketing Director, East Midlands Div., N.C.B.; G. W. J. Bradley, General Manager, Carbonisation Sec., East Midlands Div., N.C.B.; J. T. Rice, M.B.E., J.P., Assistant Production Manager, No. 3 Area, N.C.B.; Dr. F. A. Williams, Scientific Dept., Ministry of Fuel and Power; Eric Bellingham, O.B.E., LL.B.; F. Fereday, M.SC., Tech. Administrative Officer, B.C.U.R.A.; T. F. Hurley, Chief Research Engineer, D.S.I.R., F.R.S.; Arnold Marsh, M.SC.TECH., M.INST.F., National Smoke Abatement Soc.; K. E. Walker, Assistant Managing Director, Newton, Chambers & Co., Ltd.; J. Rippon, General Sales Manager, Newton, Chambers & Co., Ltd.; N. H. Martell, Managing Director, Charles Franklin, Ltd.; F. W. Kinnill, Director, Richard Cockerell and Co., Ltd.

On October 5 at the Royal Institution, London, Dr. Alexander Fleck delivered this lecture under the title 'Origins and Development of Gas for Industrial Purposes.'

MURDOCH MEMORIAL LECTURE

TWO hundred years have now passed since the birth of William Murdoch, one of the greatest men of the gas industry, and it is fitting that the bicentenary of this occasion should be commemorated by a review of the developments which have taken place in the industry since Murdoch's pioneering days. Considering the vast ramifications of the gas industry today and its influence on other industries, particularly the chemical engineering industry, it is, perhaps, of special significance that Dr. Alexander Fleck, Chairman of Imperial Chemical Industries, should have been asked by the President of the Institution of Gas Engineers to deliver the lecture. In view of the fact that the late Dr. E. F. Armstrong, in his memorial lecture on the occasion of the centenary of Murdoch's death, dealt exhaustively with the life and work of Murdoch, Dr. Fleck contented himself with a brief opening review of these matters. After this he gave a short summary of the early history of the gas industry with emphasis on the developments of producer gas and water gas plants and the utilisation of these gases.

The major part of the lecture was devoted to the use of various carbonisation gases in the chemical industry both at home and abroad, this being a subject on which Dr. Fleck could speak as one of the greatest living authorities. The sections of his address which deal with the uses of gas as a source of chemicals, with the gasification of coal and oil, and with developments in the recovery and use of natural gas and refinery gases are given in the following paragraphs.

Gas as a Source of Chemicals

Other factors besides demand for a gaseous fuel have stimulated gas manufacture. In 1874, Ludwig Mond started, at Winnington, the manufacture of soda ash for which he needed a supply of ammonia. He was naturally anxious to obtain it as cheaply as possible, and, in his search for new sources, Mond found that 50% of the nitrogen in coal could be obtained as ammonia when coal is gasified in a large excess of steam. Acting directly on this laboratory experiment, he built a producer gas plant capable of gasifying 200 tons per day of coal, and was able to recover up to 70 lb. of ammonium sulphate per ton of coal used, more than twice as much as could then be recovered by carbonisation. At this time and for many years to come until the arrival of the synthetic product, ammonia was expensive and it became a valuable by-product of gas manufacture both by carbonisation and gasification of coal. Mond formed The Power Gas Corporation to exploit the process, and, recognising that the gas was eminently suitable for small-scale furnace and foundry work, he was also instrumental in founding the South Staffordshire Mond Gas Company to make and distribute it to a large number of industrial enterprises.

Mond also built the first Semet-Solvay by-product recovery ovens to provide further supplies of ammonia and to produce the coke he needed for lime burning. From his researches on nickel carbonyl, he was led to develop the Mond nickel process and thus to a new process for which water gas is required.

One of the first uses of producer gas for chemical manufacture was for the production of formic and oxalic acids by a process invented by Goldschmidt in 1907. In this process, producer gas, containing as much carbon monoxide as possible, is compressed and brought into contact with hot caustic soda to form sodium formate from which formic acid and oxalic acid can be obtained. By 1915, 17 plants, with a total production of 100 tons a day of formic acid, were operating, including one at Widnes, operated by the United Alkali Company.

The discovery that nickel can catalyse the hydrogenation of vegetable oils and fats to produce fats suitable for human consumption, opened up another field. For the technical hardening of fats, hydrogen is frequently obtained by the steam/iron process, for which water gas is a most convenient source of reducing gas. Although not representing a large demand for hydrogen, fat hardening now occupies an important position in the world's supply of fats.

In 1898, Sir William Crookes predicted that many would starve unless new sources of nitrogenous fertilisers were found. Increasing quantities of fixed nitrogen were being applied to the land, and the rapidly rising chemical industry was demanding more and more ammonia and nitric acid for chemical manufacture and explosives. The coking industry progressively adopted by-product recovery ovens, more Mond gas plants were built, and ammonia was recovered by the gas industry and from shale oil distillation. These indigenous sources of fixed nitrogen were inadequate and the natural deposits of Chile were being used up at a rate that would have exhausted them in the foreseeable future.

The shortage and cost of fixed nitrogen stimulated the search for suitable means of utilizing the free nitrogen of the atmosphere. Out of the many processes proposed for the synthesis of nitrogen compounds, the process based on the gasification of solid fuel is the one most commonly employed. For the synthesis of ammonia, hydrogen in large quantities is required, and water gas or similar gases have usually been the cheapest source. Carbon monoxide, associated with hydrogen in water gas, readily reacts with steam in the presence of a catalyst to form more hydrogen and carbon dioxide, and thus the whole fuel value of water gas can be utilised. Producer gas made either during part of the gas-making cycle of a water gas generator, or in separate equipment, is a suitable source of nitrogen and can contribute part of the hydrogen required. From these gases, water gas and producer gas, obtained by processes already well established by the gas industry, Haber and Bosch succeeded in 1913 in synthesising ammonia from its elements.

A similar process was employed by Brunner Mond and Company in the plant they built at Billingham in 1923. During the subsequent years, expansion was rapid, and by 1929 the annual production there had reached 100,000 tons more than had previously been made from all other indigenous sources and all obtained by the gasification of coke. Similar plants, some based on coke and some based on coke oven gas, were built in other countries, and, apart from post-war years and the years of the depression, expansion in number and productive capacity has been continuous. Today, the capacity of the world's synthetic nitrogen industry exceeds 5 mill. tons, mainly in the form of fertilisers to give the increase in productivity of the soil that has become essential to avoid the starvation that Sir William Crookes foresaw.

From ammonia, all the simple compounds of nitrogen can be made for a host of other manufactures. Direct oxidation produces nitric acid, on which rests the manufacture of explosives, intermediates for dyestuffs and pharmaceuticals, and nitro-cellulose, the basis of car and furniture lacquers and leathercloth. Cyanides are required for extracting gold and silver ores, the case hardening of metals, and the manufacture of methacrylate resins. Urea, hardly more than a laboratory chemical when synthetic ammonia was first made, is now increasingly used for the manufacture of light coloured plastics and in the production of non-creasing

textiles. Anhydrous ammonia is employed to preserve rubber latex so that it may be shipped direct from plantation to works, and its decomposition products serve the metal industries in such operations as nitriding, atomic hydrogen welding and bright thermal treatment.

The successful synthesis of ammonia demonstrated the great possibilities that catalysts and modern engineering techniques possess for chemical synthesis. The synthesis of methanol from carbon monoxide and hydrogen, requiring a technique similar to that used for ammonia synthesis, followed immediately. Since then the growth of the plastics industry has created increasing demands for this product to supply its needs for formaldehyde. In much the same way as Murdoch's gas light displaced the natural products of his time, synthetic methanol has displaced the natural product, and its synthesis from the gasification products of coal has enormously extended the supply available.

The post-war years have, moreover, brought forth new processes requiring hydrogen and carbon monoxide. The synthetic fibre "Nylon," for example, requires cyclohexane obtained by hydrogenating benzene. Higher alcohols for detergents, solvents and plasticizers are now made by the hydrogenolysis of natural oils and fats and by synthesis from hydrogen, carbon monoxide and the corresponding olefine.

In the liquid-fuel field, improvement to various types of Fischer-Tropsch process, such as the old fixed-bed and the newer slurry and fluidization processes, have produced a better quality product and reduced capital costs. At the present moment, a plant employing the newer processes is being built in South Africa, where economic conditions would appear to be especially favourable.

Developments in Coal Gasification

All these demands for hydrogen in this country have been met almost entirely by the gasification of coke. The make-and-blow process of gasification requires a lump fuel, and we have been fortunate in having the best coking coal in the world with which to make coke well suited to this method of gasification. Good quality, high volatile coking coal, suitable for gas making, has also been freely available for the needs of the gas industry. Today, the picture is changing. The best coking coals are being used at a greater rate than other types of coal in relation to the reserves available, and the coking varieties are generally more expensive than the weakly caking or non-caking varieties. Prospective shortages in traditional supplies, high costs and the need for high productivity, are directing research to simpler or more efficient processes.

In other countries not so fortunate as we are in having coal suitable for the old-established processes, new types of processes for gasification have appeared. These countries now require their own nitrogenous fertiliser factories based on their own indigenous fuels, and, for them, new methods of making the hydrogen needed are essential.

The Potential of Oxygen

Methods of utilising non-coking coals in the manufacture of coke by blending good and poor quality coking coals have been practised for some time and reduce the demand for the more expensive coals. New types of carbonising processes and new methods of increasing the capacity of existing processes are being tried, but these are still mainly in the experimental stage. The radical improvements in oxygen manufacture associated with the name of Fränkl, together with the more recent developments, mainly arising from large-scale manufacture, have opened up many new possibilities for utilising coals unsuitable for carbonisation and gasification by the older processes. Oxygen made on a large scale is now cheap enough for use in new gasification methods to make them competitive with existing methods, either for the industrial hydrogen user, or for the gas industry. Continuous operation throughout the year, carried out on the large scale, puts the synthetic chemical industry in an especially favourable situation to take advantage of the possibilities that oxygen offers.

The first successful application of oxygen for gasification was in Germany for the gasification of brown coal in a fluidised bed. For the reactive brown coals and brown coal chars, cheaply available in Eastern Germany, this process was very successful and was a very important source of hydrogen for the German hydrogenation plants. New plants have been erected in Spain and Yugoslavia, and a type of bituminous coal has been gasified in Japan. This process is, however, of little interest to this country for the types of coal we have here.

Gasification of coke with oxygen achieves a saving in coke consumption and has been adopted in Germany, Holland and America for synthesis gas manufacture. Under slagging conditions, a noteworthy increase in gasification rates can be achieved in addition to the saving in coke consumption. This method of gasification appears to the best advantage where the difference is abnormally wide between the price of coke and the price of coal for electric power. To some extent, it also widens the range of cokes that may be used, but it still requires lump coke derived from coking coal.

Direct gasification of coal by a make-and-blow process has been the goal of gas engineers for many years, but only limited success has been achieved in combining carbonisation and gasification in one piece of equipment. A new development is the Gaz Intégrale, usually referred to as the G.I. process, now being operated in France and Italy. Direct gasification of coal in static beds produces, however, a gas containing methane, a welcome addition to its calorific value when required as a fuel gas, but an unwanted inert when required for synthesis gas.

Synthesis Gases

Oxygen presents new ways of directly gasifying coal to produce synthesis gas substantially free from unwanted inerts. With oxygen, a fuel bed for heat storage is no longer necessary, and coal can be continuously gasified as fast as it is fed to the gasifier. Synthesis gas is now being made in Finland by the Koppers process, which gasifies powdered coal entrained in a stream of oxygen, the ash being mainly recovered as dust. In America, du Pont are employing a somewhat similar process, but there the ash is removed as slag. One attraction of these processes is that a very wide range of coals may be used, but they do not make full use of the latent possibilities that oxygen possesses, to which I would now refer.

Oxygen is only comparatively cheap; so long as it merely functions as a more concentrated form of air, the economies achieved are largely offset by the cost of oxygen. Advantage must be taken of the fact that, with oxygen, coal can be gasified at pressure. For the gas industry, gasification at pressure offers a welcome opportunity to produce a gas of high calorific value from weakly caking coals. The work of the former Gas Research Board has shown that methane is synthesised in the upper zones of a pressure gasifier of the Lurgi type and thus enriches the water gas made in the lower zones. Pressure gasification, originally developed for brown coal and now adapted for weakly caking coal, neatly gasifies coal completely, and in one operation produces a rich gas with little further need for enrichment.

For synthesis gas manufacture, gasification with oxygen at pressure has a number of attractive features. Appreciable savings in compression cost can be achieved since three volumes of compressed gas can be obtained for the cost of compressing one volume of oxygen. By employing an entrainment gasifier of the kind developed by the Texaco Company, or the U.S. Bureau of Mines, there is every reason to believe that coal can be completely gasified without forming methane, and by the combined effects of temperature and pressure very high outputs can be obtained.

The material cost of oxygen has contributed towards directing attention to other ways of gasifying coal for synthesis purposes. In the fluidised gasification process that has been tried by Imperial Chemical Industries at Billingham, advantage was taken of the fact that fluidised solids are readily transferred from one vessel to another, and thus the solids in circulation could be continuously heated in one vessel and water gas continuously made in the other. This process suffered a serious disadvantage in that 20 to 25% of the carbon fed to the gasifier was lost as dust and could only be utilised for steam raising.

None of these processes employing oxygen has so far been adopted in this country. In some of them, further research and development is required, but there is little doubt that it is along these lines that new gasification methods will develop.

I have mentioned a number of methods of complete gasification which are at present under development. From a technical point of view, they have many potential advantages, of which most important of all to us in this country is the

higher calorific efficiency in use of the raw material coal. From the point of view of the chemical industry, however, there are certain drawbacks which have to be considered.

It is fairly common knowledge that the increased raw material requirements of our rapidly expanding chemical industry for coal by-products of the carbonisation and gasification processes, such as phenol, benzene, toluene, xylene, naphthalene, and the like, are already moving to outstrip availability from such by-product sources, and that position has indeed in some cases been reached. As and when processes for complete gasification of coal develop to practical and possibly widespread industrial application, there would seem to be the likelihood that the contribution towards the chemical industry's needs of such by-products as have come from gasification processes will materially lessen, and to that extent the ensuring of alternative sources at economic prices will need careful consideration.

Developments in Oil Gasification

All the new developments in gasification that I have discussed so far are based on coal, our only indigenous source of fuel. Until recently, the use of oil in gasification has been mainly confined to the gas industry for enrichment of water gas, but changes in the relative prices of oil and coal are now extending its uses to other fields in which fuel gases based on coal have previously been exclusively employed.

War-time difficulties with coal supplies directed attention to complete gasification of oil to supplement the supply of gas. Oil gasification is an old process, but the gas made was unsuitable for normal distribution in this country, and new methods had to be devised. Research by the gas boards has now shown the way to make a gas suitable for our conditions, and full credit is due to those concerned in this development.

For high-temperature furnaces, oil is displacing producer gas, and the ease with which it may be used, together with its high radiation efficiency, helps towards the high productivity we expect to-day. Synthesis gas is also being made from oil in both atmospheric and pressure processes both using oxygen; plants employing the atmospheric pressure process are operating in Italy, and some of the new ammonia plants now being built in America will use the pressure process. For this country, there is reason to think that in the near future processes on that basis may prove desirable both from an economic and a technical point of view.

Natural Gas and Refinery Gases

In considering the developments in gasification processes, we must not exclude consideration of the possibilities that natural gas and refinery gases possess. The tremendous importance of natural gas to the economy of the United States of America is well known. Recent explorations in other parts of the world have led to the discovery of natural gas in Holland, France, Italy, Germany, Pakistan and Great Britain. Northern Holland is now supplied with natural gas to the exclusion of traditional gaseous fuels, and France and Italy have chemical industries based on natural gas as a source of synthesis gas. To these countries with insufficient or little indigenous fuel, natural gas is a welcome addition to their natural resources. In Great Britain, natural gas has been found in Scotland, Sussex and Yorkshire, but the amounts available have yet to be determined. Drilling for natural gas is an expensive business, but the prize is well worth the effort. I.C.I. is continuing the search in North Yorkshire, and the Gas Council is proceeding with its five year programme in other parts of the country.

Refining of petroleum and the hydrogenation of coal and creosote produce hydrocarbons of low molecular weight suitable for synthesis gas manufacture. Saturated hydrocarbons have been available at Billingham since hydrogenation started in 1935, and a plant for converting them to synthesis gas was erected in 1936. In the process employed, the hydrocarbons are mixed with steam and passed through heated tubes containing a catalyst. It is a most efficient process for making synthesis gas, but, unfortunately, the supply of hydrocarbon gas is restricted and we have not been able to extend it. A similar process is employed in the United States of America and Canada for ammonia synthesis, and was used during the war at Heysham to supply more than a third of the hydrogen required for hydrogenation.

'MURDOCH—A VERY GREAT MAN'

Mr. W. K. Tate, President of the Institution of Gas Engineers, in introducing Dr. Fleck, said insufficient tribute had been paid to Murdoch's genius in the past, but representatives of Governments, of many industries, and of the great scientific and engineering institutions of this country had come together out of respect to the man and his achievements, and to hear the Murdoch Memorial Lecture by Dr. Fleck, Chairman of Imperial Chemical Industries, Ltd., who was himself a Scotsman of international repute.

Murdoch was primarily a mechanical engineer of a keen and original turn of mind who invented, among other things, the D slide valve for steam engines. His particular form of mental strength lay in being able to harness and direct to practical ends the various phenomena which were already known to other and earlier investigators. He was content to show the way by successful application and leave to others the development and perfection of a process. So it came about that, after the epoch-making illumination of the Soho factory of Boulton and Watt in 1802 he turned to experiments with various designs of gasworks plant, but he left to his assistant, Samuel Clegg, the commercial development of the equipment, and it was that Samuel Clegg who, in 1812, came to London as Engineer of the first Gas Company in the world. Murdoch was a very great man who, directly and indirectly, was a true parent, not only of gas lighting, but also of the gas industry.

Sir Harold Smith, Chairman of the Gas Council, in thanking Dr. Fleck, said no greater tribute could be paid to Murdoch than a realisation that his original work had resulted, through the efforts of those who had followed him, in the dependence today of the inhabitants of over 12 mill. homes in Great Britain on a supply of gas for cooking and for many other necessities and amenities? Not only did the people depend largely for their well-being on a supply of gas, but an infinite variety of industries, including some of the most modern, paid tribute to the part gas played and was playing in their development; and Dr. Fleck in his lecture had pointed out the importance of gas as a source of chemicals. The torch lit by Murdoch had spread its light not over Great Britain alone, but over the civilised world. He began by carbonising coal, according to local tradition, in his mothers' teapot. He would be surprised were he alive today to find that the few pounds of coal he first gasified had grown to over 27 mill. tons in a year. He might be still more surprised to find that the industry which had grown up as a result of his early experiments was now told that it could not have all the gas-making coals it required as the demand for them exceeded the supply.

The gas industry had preached the gospel of economy in the use of fuel for many years. It was not content only to lift up its voice in the wildnerness crying, perhaps in vain, for more gas coal, but was taking practical steps, indicated by Dr. Fleck, to produce gas by methods not requiring coal, by the use of butane and propane air mixtures, by the catalytic gasification of oil residues, by the use of methane drained from coal, and by searching for natural gas.

'It would be appropriate here,' said Sir Harold, 'to reveal for the first time that the illustrious William Murdoch himself experimented with lighting his house at Redruth in Cornwall, not only with coal gas, but with natural gas. The story was told to me by Mrs. Gertie Wandel, a member of the Danish Parliament, who married the great great grandson of William Murdoch. As a young married woman, Mrs. Wandel, who has come over from Copenhagen expressly to hear this lecture, tells me that she delighted to listen to the stories told by her mother-in-law of the remarkable ancestor of the family into which she had married. One of the stories was that William Murdoch piped natural gas from one of the mines on which he was working nearby into the centre of his living room, so that the pipe poked through the dining table, the family eating their meals by the feeble light it provided. And it was on this natural gas light that Murdoch experimented with burners to make the flame burn more brightly.'

If William Murdoch could see the gas industry at work today he might point with pride to the prediction he made in 1809: 'For my part, I think posterity will enjoy this invention, as they now do others, in greater perfection at some distant period from the era of its commencement.' Looking back over the century and a half since that statement was made we could see how far the gas industry had travelled. Of Murdoch it could be said 'He builded better than he knew.'

The **President** expressed thanks to Lord Brabazon and the Council of the Royal Institution for making their famous hall available for so unique an occasion.

THE FIFTH YEAR

Gas Council Reports Record Industrial Sales

The fifth annual reports of the Gas Council and the area boards, together with the report of the Minister of Fuel and Power on the exercise of his functions under the Gas Act, 1948, were published yesterday (October 12). Covering the year ended March 31, 1954, the reports were issued a fortnight earlier than the fourth annual reports last year. Although total gas sales were 0.4% lower than in the previous year, industrial sales, now accounting for more than a quarter of the total, showed an increase of 3%, and the year under review is said to have been 'in many respects the most satisfying since vesting date.'

The aggregate result of the area boards' operations for the fifth financial year, on a gross income of £297,424,121, was a net surplus of £2,111,536. This surplus was achieved after charging £16,378,663 for depreciation, £13,288,501 for interest, and £400,000 for contributions to the central guarantee fund which the Gas Council is required to maintain, and also after four boards had provided a total of £248,000 for taxation, and three boards had transferred to their revenue accounts £885,000, being provisions for taxation made in previous years and no longer required. Nine boards had surpluses and three deficiencies.

After making adjustments for previous years and bringing in the balances on net revenue accounts at March 31, 1953, the position was that 11 boards had surpluses totalling £4,472,720 and one board (Scottish) a deficiency of £341,568. Six boards placed a total of £1,045,000 to reserve funds and four boards transferred a total of £375,000 to replacement and obsolescence reserves.

The report, signed as usual by Sir Harold Smith, Mr. Henry F. Jones, and Mr. F. G. Brewer, Chairman, Deputy Chairman, and Secretary respectively of the Gas Council, is of greater volume than its predecessors, the Council having felt it appropriate, as five years have elapsed since vesting date, to include a general review of activities and progress made during that period. The first three years which followed vesting date, says the report, were mainly years of organisation, planning, and endeavour to overtake arrears of constructional and other work which faced the area boards when they assumed their responsibilities. Steady progress was made during that time and in spite of shortages of essential materials useful additions were made to the manufacturing capacity of the industry, and there was continuous improvement in the efficiency of production.

The fourth year can be said to have marked the transition from the preparatory stage. In the fifth year the accent has been on development. Research and investigation into new sources of gas were initiated; development plants for the next five years have been formulated and approved; in their commercial activities the boards have been freed from restraints which hindered the promotion of their business; and further improvements have been made in the efficiency both of production and of service to consumers.

The fifth year showed evidence of a growing public consciousness of the use which the gas industry makes of the nation's coal. 'Whatever the recommendations of the Committee on Air Pollution, and whatever action may follow its recommendations,' concludes the report, 'it is clear that the gas industry can make a growing contribution to the fuel services of the nation and to more healthy conditions of living. The aim of the industry is to provide the most efficient service at the lowest possible price. What would help the boards more than anything else to fulfil this aim would be a period of stability, particularly in the price and availability of their chief raw material, coal.'

For the five years since vesting date the cumulative surplus, after transfers to taxation reserves, is £8,513,000, of which £3,320,000 has been placed to reserve funds, £2,500,000 to replacement and obsolescence reserves, and £2,711,000 is carried forward. The aggregate result of the 12 boards' operations after contributing £400,000 to the central guarantee fund, but before making any transfers to or from reserves for taxation, is a surplus of £1,474,536. Table 1 sets out the results of the individual board's operations for the year after providing for the statutory contributions to the central guarantee fund.

The number of therms sold by all boards, together with the corresponding income, is given in Table 2.

By-Products

Revenue from by-products obtained from the manufacture of gas was as shown in Table 3.

The gross cost of gas manufactured and purchased for the year was £171.1 mill., which was reduced to £103.8 mill. by the deduction of £67.3 mill. revenue from the disposal of by-products. The net figure represents an average cost of 9.91d. per therm of gas sold, compared with 9.27d. for the previous year.

Details are given of the principal items of expense incurred by each board in gas making; details of the total net cost of £103.8 mill., with the corresponding figures for 1952-53, are given in Table 4.

TABLE 1.—FINANCIAL RESULTS OF EACH AREA BOARD

Board	Net Surplus (+) or Net Deficiency (−) for 1953/1954 before Taxation	Transfers to and from Taxation Reserves	Net Surplus (+) or Net Deficiency (−) for 1953/1954 after Transfers to and from Taxation Reserves	Adjustments relating to prior years	Balance 31st March, 1953 Surplus (+) Deficiency (−)	Total Columns 4, 5 and 6	Placed to		Balances carried forward on Net Revenue Account at 31st March, 1954
							Reserve Funds	Replacement and Obsolescence Reserves	
	£	£	£	£	£	£	£	£	£
Scottish	− 167,718	—	− 167,718	+ 190,797	− 364,647	− 341,568	—	—	− 341,568
Northern	+ 97,299	73,000	+ 24,299	+ 8,074	+ 69,000	+ 101,373	—	—	+ 101,373
North Western ..	+ 992,029	—	+ 992,029	− 2,060	− 438,894	+ 551,075	200,000	—	+ 351,075
North Eastern ..	+ 166,318	—	+ 166,318	− 12,673	+ 83,538	+ 237,183	150,000	—	+ 87,183
East Midlands ..	+ 253,409	105,000	+ 148,409	—	+ 226,569	+ 374,978	25,000	100,000	+ 249,978
West Midlands ..	+ 6,910	Cr.525,000	+ 531,910	—	+ 342,274	+ 874,184	150,000	100,000	+ 624,184
Wales	+ 94,378	—	+ 94,378	+ 2,019	+ 107,793	+ 204,190	20,000	75,000	+ 109,190
Eastern	− 47,322	Cr. 30 000	− 17,322	—	+ 190,309	+ 172,987	—	—	+ 172,987
North Thames ..	+ 485,789	20,000	+ 465,789	+ 70,253	+ 684,017	+1,220,059	500,000	—	+ 720,059
South Eastern ..	− 475,983	Cr.330,000	− 145,983	+ 56,318	+ 621,914	+ 532,249	—	—	+ 532,249
Southern	+ 57,426	50,000	+ 7,426	+ 17,230	+ 119,502	+ 144,158	—	100,000	+ 44,158
South Western ..	+ 12,001	—	+ 12,001	+ 5,229	+ 43,054	+ 60,284	—	—	+ 60,284
	+1,474,536	Cr.637,000	+2,111,536	+ 335,187	+1,684,429	+4,131,152	1,045,000	375,000	+2,711,152

Coal and Other Sources of Gas

Supplies of coal and the prices charged for it continued to cause the Gas Council grave concern. The quantities provisionally allocated to the gas industry for delivery in both the summer and the winter periods were below the industry's estimated requirements and were themselves further reduced, necessitating the increased use of water gas. The Council felt it necessary to represent to the Minister the likely effects of the reduction in the quantity of coal both on supplies of gas and on the costs of production; and although in the event the industry was able to get through the generally mild winter without embarrassment, neither initial stocks nor subsequent deliveries would have been sufficient for a long, hard winter.

Though there was no increase in the pithead price of coal during the year, the industry felt the full effect of the general 10% increase, equivalent to an average rise of approximately 6s. a ton, which was applied from March 2, 1953. The result was that, together with increases in freight rates, the industry's coal bill, including handling charges, was nearly £30 mill. more than it would have been at prices ruling in 1949-50. Another advance in pithead prices averaging 3s. a ton which took effect from May 3, 1954, will still further increase the cost of coal in 1954-55. In these circumstances the Council has paid particular attention to the consideration of means by which the industry's requirements of high-priced carbonisation coal and its dependence on such coal may be lessened.

The most important research and development work in the industry at the present time is therefore devoted to—

(*a*) Improvements in the technique of carbonising by orthodox methods and the spreading of these improvements over wider areas by integration;
(*b*) Research and development in connection with plants and processes designed to gasify more weakly-caking coals which are in better supply;
(*c*) Investigations into the production of gas from sources other than coal;
(*d*) A search for natural gas; and
(*e*) Improvements in the utilisation of gas and coke.

Savings of coal already attained by improved efficiency of production are described, and an account is given of experiments which are being made with plant for the gasification of oil and of coals not traditionally regarded as gas-making coals. The Council has increased the sum which it proposes to spend on research into methods of production, and it has felt well justified in devoting £1 mill. to a five-year search for natural gas.

Under arrangements made with the D'Arcy Exploration Co., Ltd., which is conducting the search for natural gas on the Council's behalf, the places chosen for the first investigations were Cousland, in Midlothian, the East Riding of Yorkshire, Lincolnshire, and the Ashdown Forest area of Sussex. At Cousland enough was known of the geological formation to make further surveys unnecessary, and little more was needed than to select a site for a trial well, to obtain the necessary consents from landowners and others, and to prepare the site. Actual drilling began on February 15, 1954.

Search for Natural Gas

In Yorkshire a seismic survey party began work on November 15, 1953, on a line running westwards from Aldbrough on the coast, past Market Weighton and on to Hayton, where there had been previous explorations for oil. On completion of this line, work was begun on another line running north-west from Ellerby to Driffield. In Lincolnshire the line chosen for a seismic survey ran north-eastwards from Stixwould, near Woodhall Spa, to the coast, and a start on this line was made on December 1, 1953. Work on it was completed in the middle of February, 1954, and a survey was started on another line running from Skegness to Grimsby. The results of these surveys are now being studied, and where there are indications of a geological structure favourable to the accumulation of gas further investigations to determine the probable depth and extent of such a structure are being made.

The Ashdown Forest area had already been extensively surveyed by geologists, and it was necessary only to review the results of previous surveys. For this purpose a series of shallow holes was sunk on a line from Wych Cross, near Forest Row, to Ticehurst, and from the results of this resurvey sites for two trials wells were chosen, at one of which, at Crowborough, deep drilling is now in progress. 'Shows' of gas have been obtained at 800, 950 and 1,100 ft. They have been small, and only further drilling—it is intended to go down to an ultimate depth of 2,500 ft.—will prove whether there is gas at the site in any appreciable quantities; but the 'shows' are regarded as encouraging in the sense that, if there is gas available in that locality, the well has been rightly sited to find it. The Council has appointed a committee to consider the technical problems which will be associated with the receipt and distribution of any natural gas that may be found. Arrangements have been made with the Institution of Gas Engineers to collect for the Council such information as is available in other countries about the methods of reforming natural gas and methane for use in a supply of gas to the public.

Water Gas

The quantity of water gas made during 1953-54 was 83,847 mill. cu.ft., or 357.8 mill. therms, being 13% of the total gas available. In the manufacture of this quantity 1,407,000 tons of coke were used; the tonnage of oil used in gas-making, almost wholly for enriching water gas, was 455,000 tons. The corresponding figures for 1952-53 were 1,357,000 tons of coke and 436,000 tons of oil. The charge for coke, on account of the increase in the cost of coal as well as the increased quantity used, was £6,246,000, compared with £5,744,000; the cost of oil, including handling, was £6,595,000, compared with £6,658,000, there having been decreases totalling ¼d. a gal. during the year.

TABLE 2.—Gas Sales

	1953/54				
	Gas Sold		Income from Sales		Average Income per therm sold
	Mill. Therms	%	£ mill.	%	d.
Domestic—					
Credit	481.8	19.17	36.70	21.57	18.28
Prepayment	865.7	34.44	67.93	39.93	18.83
Industrial	659.0	26.22	33.50	19.69	12.20
Commercial	346.3	13.78	23.56	13.85	16.32
Public Administration	50.0	1.99	3.17	1.86	15.22
Public Lighting	48.4	1.93	2.55	1.50	12.63
	2,451.2	97.53	167.41	98.40	16.39
Gas used for own purposes ..	62.0	2.47	2.73	1.60	10.56
	2,513.2	100.00	170.14	100.00	16.25

TABLE 3.

	Sales and used for own purposes	Deduct charges and stock adjustments	1953/54 Net Income	1952/53 Net Income
	£ mill.	£ mill.	£ mill.	£ mill.
Coke and breeze	64.1	8.0	56.1	54.5
Tar and tar products	13.4	2.9	10.5	11.9
Benzole and benzole products	3.3	2.7	0.6	0.2
Other by-products	2.3	2.2	0.1	0.2
	83.1	15.8	67.3	66.8
1952/53	79.9	13.1	66.8	

TABLE 4.—Cost of Gas

1952/1953 £m.	£m.		1953/1954 £m.	£m.
		Cost of raw materials (including handling):—		
109.2		Coal	115.3	
6.7		Oil	6.6	
5.7		Coke for water gas	6.2	
	121.6			128.1
	5.4	Cost of gas purchased (crude and purified)		6.1
	9.5	Process wages		9.5
	12.7	Maintenance of buildings and plant (including wages) ..		11.9
	15.1	Other charges (including wages)		15.5
	164.3			171.1
	66.8	*Deduct*:— Income from By-products (net)		67.3
	£m. 97.5			£m. 103.8

The figures in this table are exclusive of charges for interest, depreciation and costs of administration.

TABLE 5.

Area Board	Quantity of gas purchased from coke ovens owned by the National Coal Board		Quantity of gas purchased from coke ovens other than those owned by the National Coal Board	
	Mill. cu. ft.	Mill. therms	Mill. cu. ft.	Mill. therms
Scottish	—	—	4,079	19.4
Northern	11,922	60.2	4,330	21.6
North Western	1,459	6.8	—	—
North Eastern	1,440	7.3	2,162	11.1
East Midlands	19,751	100.6	8,272	42.1
West Midlands	—	—	3,900	20.4
Wales	4,652	21.8	6,572	33.1
North Thames	—	—	737	3.8
Totals	39,224	196.7	30,052	151.5
1952/53 Totals ..	37,992	188.6	30,112	153.0

Gas Purchased from Coke Ovens

The quantity of gas purchased from coke ovens during the year was 69,276 mill. cu.ft., or 348.2 mill. therms, as shown in Table 5.

The total was more by 2% than the total for 1952-53, the additional quantity being obtained from coke ovens owned by the National Coal Board. Of the total quantity of gas which the Wales Board had available in 1953-54 63% came from coke ovens, and the Northern and East Midlands Boards obtained nearly half their gas from that source. Of the other boards which purchase gas, only one, the North Eastern, obtained more than 10% of its gas from coke ovens, and in the case of the North Thames Board the proportion was less than 1%. For the whole industry the percentage of gas bought from coke ovens was 12.7%.

Liquefied Petroleum Gases

Plants for the supply of gas by the mixture of air with the petroleum products butane and propane are now well established at Whitland in Carmarthenshire, where the first plant was installed, at Bungay and Framlingham in East Anglia, and at St. Just in Cornwall. All these are places where, by reason of their size and location, the continued manufacture of coal gas would have been very expensive and where linking with a larger unit would have been economically impracticable. They have proved their value for the purpose for which they were intended, and the places they serve are now receiving satisfactory supplies of gas. The question of further installations depends to a great extent on the price charge for butane and propane.

The feasibility of the industry's taking supplies of 'tail' gases from oil refineries is a complex question, involving not only the economic interests of both parties, including the cost of transmitting the gases, but also the important issue of the extent to which continuity of supplies over a period satisfactory to the recipient can be guaranteed. Discussions between some of the boards and the companies operating oil refineries within their areas have been held and are continuing, but the only board at present taking gas from oil refineries is still the North Western Board. The quantity purchased by that board in 1953-54 was 4.7 mill. therms, compared with 6.1 mill. therms in the previous year.

Methane from Coal Mines

Since 1953 the Northern Gas Board has taken a supply of methane from the Haig Colliery, Whitehaven, and part of this gas has been reformed experimentally in a setting of horizontal retorts at the Whitehaven gasworks. Much useful information has been obtained and a pilot plant for the adaptation of the methane is under construction. The Wales Board has made arrangements for a supply of methane from the Point of Ayr Colliery in North Wales. The North Western and South Western Divisions of the National Coal Board are carrying out investigations and experiments on the drainage of methane from other collieries in North and South Wales. The Wales Gas Board is collaborating in these investigations.

Co-operation with N.C.B.

While each area board is responsible for arranging with the appropriate division of the National Coal Board for the delivery of the coals allocated to it, the allocation of the total quantity of coal allotted to the gas industry is made by the Gas Council after agreement has been reached by the Coal and Oil Committee. In the course of a year many general questions of coal supplies arise, and the means for discussing them with the National Coal Board is provided by the Joint Commercial and Technical Committee composed of representatives of the two industries. Questions beyond the scope of this joint committee are discussed directly between the Chairmen of the Council and the National Coal Board, and, if necessary, with the Minister. There has been regular consultation between the Council and the Coal Board throughout the year.

its replacement by modern installations.

Two important new works were brought into commission during the year. The first was that of the West Midlands Board at Swan Village, Birmingham. The second was the Wales Board's Maelor Works, near Wrexham, which was opened by Lord Lloyd, Parliamentary Under Secretary of State (Welsh Affairs) on October 1. It has a capacity of 2.25 mill. cu.ft. a day, which is provided by intermittent vertical chamber ovens and two carburetted water gas sets each of 0.75 mill. cu.ft. daily capacity. The commencement of production at this works enabled the Board to cease manufacture at Wrexham and Cefn Mawr.

A reconstruction which almost amounted to a new works was the 15 mill. cu.ft. a day continuous vertical retort installation at the Portslade Works of the South Eastern Gas Board, the first section of which came into production during last winter although its official opening by the Duke of Norfolk did not take place until after the end of the financial year.

The East Midlands Board brought into operation the first section of reconstructed horizontal retorts at its Grimethorpe Works at Sheffield; installations of continuous vertical retorts at Derby and Lincoln; and carburetted water gas plants to a total capacity of 5.15 mill. cu.ft. a day at four other works. Carburetted water gas plants also figured prominently in the additions of the North Thames Board, three with a combined daily capacity of 12 mill. cu.ft. having been put to work at Southall. The further addition of 12.5 mill. cu.ft. a day of continuous vertical retort capacity at Kensal Green and Bromley, less the plant of 5 mill. cu.ft. a day capacity shut down during the year, brings the total rated daily capacity of the North Thames Board to 393 mill. cu.ft. a day. The plant taken out of commission included one of the first large-scale commercial continuous vertical retort installations to be operated in the country.

The North Western Board brought

TABLE 6.—Area Board Results

	Gas Sales			
	Therms	Revenue £	Consumers	Employees
Scottish	198,210,000	13,475,381	1,236,871	10,997
Northern	154,096,000	7,562,161	685,972	7,060
North Western	343,280,000	23,704,969	1,781,633	19,466
North Eastern	143,231,000	10,090,460	852,936	8,554
East Midlands	263,035,000	13,677,051	1,122,949	11,328
West Midlands	303,507,000	18,859,542	1,065,530	13,221
Wales	76,585,000	5,277,279	447,028	4,601
Eastern	132,289,000	10,317,393	707,990	8,993
North Thames	396,566,000	28,603,919	1,836,574	24,826
South Eastern	277,871,000	20,593,290	1,512,004	20,832
Southern	111,010,000	8,833,443	580,082	7,186
South Western	113,508,000	9,143,642	645,249	7,760
Gas Council	—	—	—	207
Totals	2,513,118	170,138,530	12,474,818	145,031
1952-53 *Totals*	*2,523,679*	*163,997,973*	*12,273,273*	*147,461*

Table 6 summarises the boards' results in terms of gas sales, revenue, consumers, and numbers of persons employed, and is compiled from various tables in the Gas Council's report.

Manufacturing Plant

The total manufacturing capacity of the industry rose during the year from 2,384.7 mill. cu.ft., or 11,374,800 therms a day to 2,418.3 mill. cu.ft., or 11,552,100 therms, an increase of 1.4%. The greater part of the increase was in carburetted water gas, producer gas and oil gas-plant; but the net increase of 7 mill. cu.ft. in carbonising plant is after allowing for the scrapping of plant to the capacity of some 60 mill. cu.ft. and plant with a daily capacity of 15.85 mill. cu.ft. into commission during the year. Plant at the Partington Station, Manchester, includes a recent installation of continuous vertical retorts consisting of two benches ecah of sixteen 82 in. retorts and each having a capacity of 2 mill. cu.ft. a day. One of these benches has been converted in order that trials on a commercial scale may be made of a process, developed experimentally in the Rochdale Station of the Board, which is designed to increase the throughput of coal by the introduction of a carrier gas at the bases of the retorts. The process is based on an invention patented 30 years ago but not hitherto developed.

Co-ordination of Gas Supplies

Just as improved steel supplies have permitted acceleration of programmes for the construction of plant and holders, so the easier positon with cast iron pipes makes it possible to report considerably better progress than last year with main laying projects. At March 31 the total length of mains in use was 83,427, by comparison with 81,082 a year earlier. The increase over the year is nearly 500 miles greater than that for the previous year.

All boards report an increase in the rate of main laying over the previous year, ranging up to 45% in the case of the East Midlands Board, which has made considerable progress with the 'backbone' main that will ultimately run from Doncaster to Northampton. All but two of its eight sections have covered more than three-fifths of the way to completion.

Service to Consumers

In the 12 months ended March 31, 327,438 permanent houses were completed—287,531 in England and Wales and 39,907 in Scotland. The number was greater by 71,694 than the number for the previous year, and was the greatest for any period since the war. The aim of the boards is to ensure that as many new houses as possible are provided with a gas service. Where the tenants are given freedom of choice their preference for gas for cooking remains undiminished. In the area of the North Thames Board, for example, 85% of the 20,000 new dwellings occupied have gas cookers, and in addition 59% have gas-ignited solid fuel grates installed in them. In the South Eastern Area 94% of the 27,249 new dwellings completed during the year were equipped with gas, and 84% of the occupants of the houses so equipped chose gas for cooking. In addition there was an increase in the number of water heaters and gas-ignited coke grates fitted in these new houses. The North Western Board reports that 83% of the tenants of new housing estates choose gas for cooking, washing and heating appliances; and in the Northern Area, where coal is largely the traditional fuel, 15,323, or 87%, of the 17,571 houses completed during the year were equipped with gas services and, of these, 13,743, or 78%, have gas cookers. A feature of recent months has been the large proportion of the new houses built for miners in which gas is used.

Sales of Gas

Sales of gas amounted to 2,513 mill. therms, compared with 2,524 mill. therms in 1952-53. Five of the Boards—Northern, Wales, West Midlands, Eastern and East Midlands—had increases ranging from 2.45% to 0.8%; the remainder had small decreases, with the result that for the whole industry there was a decrease of 0.4%. The decrease was in domestic and commercial consumption which is particularly sensitive to temperature. In 1953-54 the average monthly temperatures were lower in five months and higher in seven, including December, when the average temperature was no less than 8.7 degrees higher than in December, 1952; and December is normally a heavy month for gas demand.

A striking example of the effect of temperature was provided by the cold spell of the last week of January and the first week of February, 1954, when all previous peaks were exceeded. In contrast to the domestic and commercial loads, all boards had increases in industrial consumption, the increase for the whole industry being 3%. For the West Midlands Board industrial gas sales constituted an all-time record both in volume and in the percentage, 46.9% of total sales.

Sales of Appliances

The numbers of appliances sold, whether for cash or on hire purchase, showed a significant increase on the numbers sold in 1952-53. The increase was greatest in water heaters, the sale of which was heavily depressed in the previous year by the Hire Purchase and Credit Sale Agreements (Control) Order, 1952, which came into operation in February, 1952: the reaction of consumers when, on August 21, 1953, these appliances were made exempt from the Order was immediate. Sales of all kinds of appliances benefited from the fact that, with the relaxation of restrictions on publicity, the selling organisations of the boards could be given reasonable support for their activities.

The numbers of water heaters sold on hire purchase terms by the Boards during the last three years, showing the effect of the restrictive conditions in 1952-53, were shown in Table 7.

TABLE 7.—NUMBER OF WATER HEATERS SOLD ON HIRE PURCHASE TERMS.

AREA BOARD	For year ended March 31, 1952	For year ended March 31, 1953	For year ended March 31, 1954
SCOTTISH	2,565	1,225	2,778
NORTHERN	2,549	1,365	4,024
NORTH WESTERN	11,852	3,498	18,044
NORTH EASTERN	1,952	1,399	3,719
EAST MIDLANDS ..	4,025	2,195	6,469
WEST MIDLANDS	2,698	1,546	3,407
WALES	1,361	670	3,742
EASTERN	5,647	1,960	6,260
NORTH THAMES ..	10,627	6,434	21,083
SOUTH EASTERN	5,256	3,072	15,102
SOUTHERN ..	593	462	4,846
SOUTH WESTERN	5,919	2,639	9,995
TOTALS ..	55,044	26,465	99,469

In addition to sales on hire purchase, 58,753 water heaters were sold for cash during 1953-54. The number of cookers sold on hire purchase was 608,192 (compared with 495,000 in 1952-53) and 169,790 were sold for cash. Cookers are not subject to purchase tax, nor were they subject to the Hire Purchase Order. Among other appliances, 104,483 wash boilers and washing machines were sold on hire purchase and 154,403 for cash. Clearly there is a real public demand for the appliances which the industry has to offer and which, besides giving improved service to their users, save the nation's coal.

Gas Tubing Campaign

A window display for gas showrooms has been designed by Compoflex Co., Ltd., as part of an intensive selling campaign. The North Western Gas Board has recently specified that Compoflex flexible gas tubing should be fitted to new portable appliances sold through its showrooms, and the campaign is directed towards encouraging domestic users to utilise the same product when their existing tubing has to be replaced.

Advertisements for the tubing, now appearing in local newspapers, feature a 'sign of safety' symbol, and this has also been made into a tie-on tag for attaching to each length of tubing sold. Sale of Compoflex tubing is in the hands of Ascot Gas Water Heaters, Ltd., sole selling agents to the gas industry.

S.B.G.I. Golf

The autumn meeting of the Society of British Gas Industries Golfing Circle was held at the Richmond Golf Club on September 30. The meeting was attended by 28 members and 20 visitors.

The sum of 10 guineas was voted to be given to the Benevolent Fund of the Institution of Gas Engineers. Dr. Burns thanked the Golfing Circle on behalf of the Institution for this generous gift.

Mr. S. Clayton Thomson was unanimously elected Captain of the Golfing Circle for the coming year.

The Yates Bowl prize was won by Mr. S. Clayton Thomson; Mr. H. R. Hiscote was second; and Mr. W. Foster third. The visitors' prize was won by Mr. Martin W. Jones. In the Greensome Foursome Messrs. S. Clayton Thomson and C. T. C. Woodall came first and Messrs. W. H .G. Roach and C. Dunbar second.

N.C.B. Scholarships

National Coal Board university scholarships in mining engineering and allied subjects have been offered this year to 30 young men already working in the industry and 45 boys from outside it. Last year a total of 69 were awarded. The scholarships cover the whole cost of education and carry a maintenance allowance which may amount to £300 a year. During the last four years, 81 N.C.B. scholarship-holders have won honours degrees and 84 have taken pass degrees.

The number of awards given this year to people from outside the industry is the highest since the scheme started seven years ago. The Coal Board would like to be able to award 100 scholarships each year, but the highest number so far achieved is the 88 awarded in 1949, when there was still a comparatively large pool of qualified men in the industry.

It is not, however, the Coal Board's intention that all the industry's future managers will hold university degrees. There will always be ample provision for men who are already in the industry and are able to qualify for managerial posts by part-time study. Every facility is given for young men to do this, including paid release during working hours for study at technical colleges.

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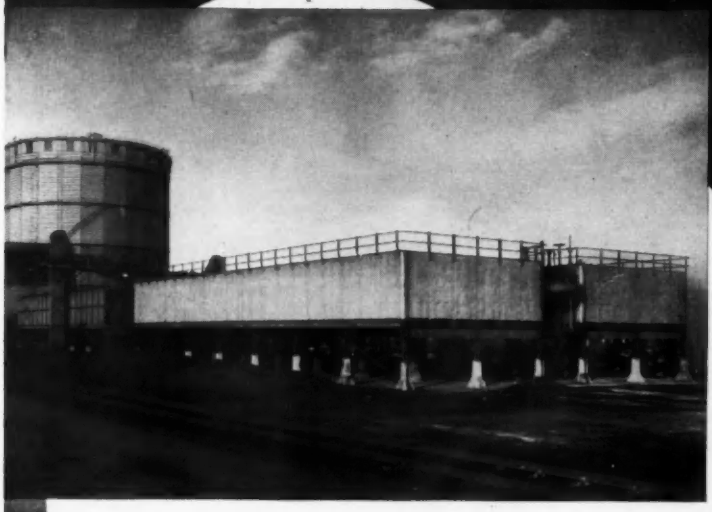

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THE SCOPE FOR IMPROVEMENT

FROM THE PRESIDENTIAL ADDRESS TO THE EASTERN JUNIOR GAS ASSOCIATION, BY

R. F. ROBINSON,

Constructional Engineer, Watford Division, Eastern Gas Board.

In the past in the gas industry an engineering training was generally considered an essential qualification for management, and there are countless examples in other industries, as well as our own, of the soundness of such a policy. It must be recognised, however, that the larger units forming the integrated organisation resulting from nationalisation will require a specialised training in management, administration, and organisation for those aspiring to management. That courses of training in management are now available and that area boards are already sending selected men to them, should serve as the strongest stimulus to every technologist and engineer to look beyond the limits of the laboratory, the works, and the distribution system, while at the same time making every effort to increase his skill, knowledge, and proficiency in his immediate task.

Quest for Optimum Efficiency

The average well conducted gasworks operates at an efficiency of approximately 80%, and while this would appear to be a satisfactory figure, there are approximately 60 therms per ton of coal carbonised which are lost or dissipated in the process. In addition to which, often considerable quantities of electricity are purchased to motivate compressors, boosters, and mechanical plant. Few processes can compare with that of gas manufacture so far as potential usage of waste heat is concerned. Liquor concentration, wash-oil distillation, steaming of retorts and heating of feed water and buildings, spring to mind as means of utilising waste heat. These should therefore be the first consideration in assessing whether or not a works is operating at optimum efficiency, assuming of course that gas and coke yields are satisfactory.

Collection of exhaust steam from exhausters and compressor engines is a relatively simple matter and will invariably prove economic. Waste heat boiler fan engines and turbines should under no circumstances discharge to atmosphere where steam is required for vertical retorts. Feed water should enter boilers at not less than 180°F. If insufficient exhaust steam for this purpose is available after meeting the requirements of retorts, benzole plant, and gas liquor concentration, water connections to gas condensers can frequently be easily adapted to provide a source of hot water. Widely scattered steam driven pumps and small engines are generally prolifically wasteful of steam and if no suitable use can be made of the exhaust steam from these units, it is more economic to replace them with electric motor drives.

Inefficient cooling of the gas, indiscriminate use of water in ammonia washers and excessive steaming of vertical retorts can result in undue weakening of ammoniacal liquor strength, with a corresponding increase in the steam required for concentration. Dirty condenser tubes contribute to this and have the added effect of increasing the water consumption. Double usage of water—i.e., for gas cooling and boiler feed, or make-up for coke quenching systems can effect a useful reduction in the quantity of water to be pumped or purchased. Attention to these and similar points has a two-fold effect. Firstly, reduction in operating cost, and secondly, in many cases an increase in the effective capacity of plant with consequent deferment of the necessity to install additional plant. If by such simple means overall efficiency is increased by only 2%, and this is easily attainable, it represents no less than six therms per ton of coal carbonised, which would result in a saving to the gas industry of not less than the equivalent of 400,000 tons of coal annually. Such a saving would, of course, be achieved by a reduction in the quantity of coke and breeze used on the works and electric power purchased.

The facilities which are provided for the handling, preparation, and loading of coke, which is our most important and remunerative by-product, are such that many of our plants would be regarded as crude and inefficient by any competent engineer who had no previous experience of coke handling. If we were to start afresh without preconceived ideas and experience, we should evolve coke plant very different from what we have today. To say this is not to cast aspersions on the many capable engineers responsible for the design of our present plants. Economic factors change, knowledge has increased, and the requirements of the coke market have altered. The differential between the value of coke and breeze has increased from 25s. per ton pre-war to 60s. today. It has recently been established that in bunkers having adequately sloped bottom floors and efficient grading screens, no troublesome discharge of pockets of dust is likely to be experienced. There is thus no need under such conditions for the provision of expensive dedusting screens on bunker loading chutes. Standard cast iron sections of spiral chutes are now available at moderate cost and no modern plant should be without this type of chute at every point where change of direction of the coke is necessary, and in the average plant there are no less than twelve such points. Jig feeders, bucket elevators and long drops for coke should be avoided like the plague.

It is a disturbing thought that degradation to breeze of one cwt. of coke during handling represents a loss of revenue of approximately 3s. The necessity for careful design of chutes and the avoidance of breakage by rough handling cannot therefore be too strongly emphasised.

Loading Facilities

The problem of providing adequate loading facilities for coke delivery vehicles seldom receives the consideration it deserves. The net revenue from coke sold in a local domestic market is frequently 20s. a ton in excess of that from coke exported to outer districts, and the importance of fostering local sales should never be overlooked. No coke sales campaign, however well organised and sustained, can be fully successful if well graded coke is not readily available at all times and especially at the time of peak winter demand. Merchants are unlikely to push coke sales in preference to coal if the latter entails no waiting time for loading their lorries and the former requires vehicles to take their turn in a queue at bunkers. No really satisfactory solution to this problem has yet been found. Mobile loading machines operating from stock heaps of graded coke incorporating dedusting screens and bag weighing facilities, are perhaps the most economical solution. These can be constructed from proprietary parts mounted on scrap War Department trailers at a cost of approximately £600/700, and used in combination with a stacking conveyor and mechanical shovel will, with one operator, bag coke at the rate of eight tons per hour. Alternatively, two such machines can be successfully employed, each loading a separate grade of coke and both machines can be comfortably fed with coke by one small crab crane. The provision of bunkers with capacity and sufficient loading chutes to meet the relatively short peak demand for coke is clearly uneconomic.

This is a problem the importance of which merits further attention, and which affords considerable scope for ingenuity in its solution. Perhaps the day is not far distant when fully automatic mechanised weighing, bag filling and loading machinery will be commonplace on gasworks.

Integration and Distribution

Integration has considerably broadened the scope of the distribution engineer. Inter-works linkage and trunk distribution have gone on apace, siting of gas storage at points of demand on the district has become common practice, and the planning of housing and industrial development separately in large estates has almost entirely replaced

the haphazard growth of the past. The effect of these changes is to largely transform gas distribution from a practice to a science. The rule of thumb and experience of the past are giving way to theoretical calculation based on data supplied by town planning authorities. The wider choice of techniques now available, the more complicated problems inherent in integrated supply systems and the constant urge to keep costs at a minimum, all require an increasing standard of competence in distribution engineers. Today, in addition to the technique of gas supply, they are increasingly called on to be mechanical engineers responsible for choosing, installing and maintaining compressors, electric motors and diesel engines. Nor is this all, for those enjoying the use of remote control and recording apparatus a working knowledge of electronics is required.

On the utilisation side of our industry, I must speak to a great extent as a consumer. It seems to me that there exists a tremendous opportunity for the exercise of imagination and ingenuity in improving the already high standard of cheapness, durability, and efficiency of gas appliances. These too are problems very largely dependent for their solution on the technologist, with perhaps the exception of ensuring that the consumer is supplied with the correct appliance for the particular purpose and seeing that such appliances are serviced and maintained economically and with despatch.

Education and Training

The education and training scheme prepared by the Eastern Gas Board is one which will cover in generous measure the requirements of students at all levels and in all departments; especially the technical students are well provided for. In my student days I considered myself generously treated in being allowed to leave early to attend evening classes three or four nights a week and having my fares paid by my employer. Today the student is reimbursed for fares and fees, and up to the Ordinary National Certificate level of study the majority of his classes are under the day-release scheme entailing at the most one evening per week. In spite of this one frequently hears that students are hard-worked in keeping up-to-date with homework and reading. That conditions are considerably easier for students today is only right and it is not always remembered when making comparisons with the past that the standard of examinations has risen considerably since pre-war. The increase in knowledge during the last 15 years has brought about a widening of the syllabus, and most of the professional bodies, including the Institution of Gas Engineers, have widened the scope of studies necessary for, and have raised the standard of, their membership examinations. To a great extent the ancillary subjects required by the several engineering institutions have been made common to all, with the result that considerably less work and time are now required to obtain membership of a second professional body. Such aids to the student should not foster the belief that less work is necessary to obtain his qualification, but rather should be regarded as encouragement to obtain higher qualifications. Nor should it be supposed that an academic or a theoretical qualification is in any way a certificate of competence in the practice of a profession; least of all is this true in engineering.

Tribute to Board Chairman

I would refer to the good fortune of those of us connected with the Eastern Gas Board in serving under a Chairman keenly interested in the training, progress and welfare of juniors; and who, by the generous support which he has always given to the Eastern Junior Gas Association, is clearly aware of the educational value of our activities and of the important contribution that the Junior Associations make towards bridging the gap between theory and practice. We are fortunate too in having the Board's excellent education and training arrangements to which I have already referred, which not only provide in generous measure for the fullest possible practical training under craft apprenticeship, staff pupilage, and post graduate training schemes, but encourage employees to follow approved courses of study by granting leave of absence for classes and examinations and re-imbursing students for fees, fares, text books, etc.

The Board having made this excellent scheme available, it is our duty to endeavour to ensure its success. The success of practical training depends to a considerable extent on the enthusiasm and interest of the officers to whom the trainee is directly responsible. We can all appreciate the truth of this when we look back over our own personal experience and remember with gratitude the guidance, encouragement, and forbearance and the criticism which we were fortunate enough to receive.

DISTILLATION OF SCOTTISH COALS

Discussion on Mr. C. A. POULSON'S Paper—see 'GAS JOURNAL,' *September 29 and October 6.*

Mr. Alex. McFadyen (Dumbarton) said Mr. Poulson and the firm he represented had, during his experience in the gas industry, provided gas engineers with much information dealing with gas yields to be expected from improved carbonising methods. Although most of the charts and tabulated results which had been issued dealt with carbonisation under test conditions, statistics had provided targets at which enthusiastic engineers could aim. In his latest paper Mr. Poulson had done more than provide relative figures. He had shown clearly and stated that, in his view, a c.v. of 425 B.Th.U. per cu.ft. was best for economic efficiency when Scottish coals were used.

It was a fact that their distribution system had to carry more gas to provide the necessary therms at lower calorific values, but that in itself should not influence the choice of c.v. The effect of low calorific value gases on appliance utilisation on the district was important and he was certain that 425 B.Th.U. gas was not troublesome where Scottish coals were used. During the past 15 years he had produced in the same works three different values, 400, 425, and 450. His experience had been that 400 B.Th.U. gas increased the maintenance necessary on water heaters and 425 B.Th.U. and 450 B Th.U. were much better in that respect. However, he felt that having regard to the coal supply position in Scotland and the revenue obtained from sale of gas relative to the sale of by-products, their aim should be to produce 425 B.Th.U. gas, more particularly in view of the fact that recent increases in the price of coal had been met mainly by increases in the price per therm of gas sold and only partially by additional revenue from by-products.

Mr. Poulson dealt mainly with two important aspects of the industry—the efficient use of fuel and increased output of gas per unit plant. The latter was of great importance. If the carrier gas process was to assist in the future they must all learn more about it. Test figures in the paper had been taken on a c.v. of 450 B.Th.U. Was there any special reason for this and what additional blue water gas would have to be used to reduce the quality to 425 B.Th.U., the c.v. of his own choice? Mr. Poulson stated that the new process should lower maintenance costs but he would like to ask if the life of refractory materials would be altered in any way. The need for extra thermal yield was important but he was disappointed to see that more tar was produced by the new process. The paper showed that extra coke was produced but did not state to what extent.

Mr. Alex Jamieson (Western Group) said the success of the gas industry in these competitive days and with the high cost of coal ruling depended on high efficiency of carbonisation. It was surely not just a coincidence that invariably, where a district was working to a high standard in the retort house a good financial result always followed. The industry in Scotland for assessing efficiency had now adopted the controversial F.E.I. method and while agreeing that it might not be the ideal, the efficiency and financial results being obtained in the Western Group were more than justifying the method. It was truer than ever today that profits were made in the retort house and it was also true to say that if costs into holder were not much reduced the industry would yet have difficulty in selling its primary product.

Load Factor

Mr. Poulson had mentioned the vertical retort as the ideal plant for Scottish coals. While not disagreeing, he felt that in

many cases vertical plants had not been used to the best advantage, little endeavour often being made to operate to full capacity. Low throughputs of coal might give a high yield per ton but with costs of new plants so high surely the correct method to use was maximum throughput of coal, maximum make of gas per retort, and full loading of plant. In his experience it was quite common in pre-war days for five ton retorts to carbonise six tons of coal per day and produce 120,000 cu. ft. of gas at 425 B.Th.U. Today, retorts of similar size were often producing only 60,000 to 70,000 cu.ft., hence the need for extra plant. To obtain good figures it was, of course, necessary to have the plant in first-class order but surely, if this were possible before the war, when coal was relatively cheap and plentiful, it was more than ever necessary today when the price of coal was so high and the capital cost of new plant so much increased.

Load factor was most important and while agreeing that the largest plants did not always produce the cheapest therm he felt Mr. Poulson would agree that there was a minimum size of plant in which high efficiency could be obtained and which could afford the necessary technical assistance. If that fact, coupled with a good load factor and judicious integration of undertakings was borne in mind, reduction in cost per therm must follow. He was glad that Mr. Poulson mentioned variations in coal supplies. This, unfortunately, was a factor over which they seemed to have little control and from the way coal was sent from the various coalfields all over the country it seemed the only organisation gaining was the Railway Executive. It was surely not beyond their powers to control the numbers of coals being sent to each district, thus allowing the district manager at least a chance of maintaining steady retort house conditions. Such a control would also allow of a more constant coke quality being produced. It was unfortunate that coke, which played such an important part in their economy, should be so difficult to handle and often difficult to sell. He hoped yet to see the day when the gas industry became what its name implied—a one-fuel industry.

The Coke Market

Mr. Poulson had given some interesting data on the controversial subject of carrier gas and it would seem with that project that the coke available for sale became more prolific than ever. Under the present system this might be considered good policy but had any thought been given as to where a market was to be found for the extra coke and what its final effect would have on the prices of that fuel? Again, it was claimed that much inferior coals could be used in the process. If so, he felt the much maligned National Coal Board would soon discover the advantages and the usual coal price increases would follow as surely as night followed day. From the carrier gas figures submitted it would seem that while the increased output from retorts was somewhere in the region of 100% the net cost of the gas was slightly higher. That figure required explanation. If the costs were correct it would seem that there were many more additional costs to meet in the carrier gas process than under normal working. It had also been stated that with that process large capital savings could be expected but when these claims were made had due allowance been made for water gas plants, of which he presumed two would be required, water gas holder, and all the extra equipment which the process required?

In conclusion, he sought information on the following points. In the paper the carrier gas therms were included in the results per ton. These amounted to about 30 therms. What would happen with coal gas injection? Surely these therms would not be included in the final make per ton. What were the relative dangers using carrier gas as against steaming? What additional technical supervision would be required? What would be the effect on plant beyond the retorts, especially purifiers and air admission? What would be the effect on the life of the retorts? Would much greater attention to retort tightness not be essential? Would Mr. Poulson be prepared to advocate a new carbonising plant of one half required capacity if carrier gas was being embodied in proposal? Could not similar conditions be affected as with carrier gas by injection of oxygen or a mixture of oxygen and steam at the base of the retort?

Units Below Par

Mr. D. L. Dickson (Fife Group) said Mr. Poulson had mentioned that the industry was due for further developments in gas production to reduce the cost of gas and so offset the effect of high capital charges. While agreeing with him, he felt that he should have gone a stage further. Not only was it necessary to curtail capital commitments and obtain the maximum use from existing plant, but they must also obtain higher efficiencies from existing units, many of which are below par. Mr. Poulson had pointed out that in the future they would be faced with using coals of a higher rank and specifically mentioned the Fife coal fields from which, in future, a high percentage of the Scottish coal for carbonising would be obtained.

As one presently using 100% of Fife coal, he found, in comparing the statistics recently supplied by the Board, much food for thought. In Dunfermline during 1953-54, using only Fife coal, they, jointly with Falkirk, had the lowest cost of gas into holder. Admittedly their cost of coal delivered was lower than the Board's average. Nevertheless, they obtained 74 therms per ton and 9.7 cwt. of saleable coke and breeze. For the year to date their thermal yield was up by five therms per ton.

He felt too much blame was attached to a particular variety of coal, rather than looking for and putting into effect the conditions most suitable to the coals received. He appreciated, however, that some Fife coals were very poor and difficult to deal with having a high ash content most upsetting to producers, etc., and that receiving a percentage of such coals could upset a work's equilibrium. The carrier gas process was simply a means of increased carbonisation on present day methods and it was disappointing to find that the savings likely to accrue from that method were mainly savings of a capital nature. Indeed, running costs as shown were slightly higher and this was scarcely to be wondered at, when, as Mr. Poulson pointed out, water gas made in situ in vertical retorts used 15 lb. of coke per 1,000 cu.ft. of water gas made, while in orthodox blue water gas plants approximately 30 lb. of coke per 1,000 cu.ft. of B.W.G. made was required. Any adoption of the carrier gas process must only be used as an interim nature to obtain full advantage of existing capital, while other methods with a higher gas making efficiency were examined. In that way, the carrier gas process would provide a useful breathing space.

Better Coke

He appreciated that the carrier gas process would probably give a much better coke for the domestic market, but he scarcely saw where they could claim that it would make a smokeless fuel of a high standard, even with excellent preparation in the form of suitable sizing and screening. After all, they started off with a coal with a fairly high ash content and, of necessity, that meant that the ash content in the coke was higher. There might be some advantages in so far that the coke could contain a higher volatile content and less breeze would be made, but, unless the coke yield per ton was greatly increased, or a wide difference existed between the price of coal and coke (in favour of coke) the economics of gas production would remain very much as they were at present. After all, coke was in competition with coal and it must be remembered that the efficiency of utilisation of coal had greatly increased by improved methods of mechanical stoking and new domestic grates which, if not entirely smoke free, had at least greatly reduced this menace.

Any further variation in the price of coal was, therefore, bound to be reflected in the price of coke and this would consequently afford little scope in reducing gas costs into holder. The industry could benefit by the adoption of the carrier process in some undertakings, particularly where holders and blue water gas plants existed which could be used without incurring any increased capital expenditure on those items. Just exactly what economies might be had could only be found out in relation to the districts concerned, since the process brought with it complications in the form of coal and coke handling with resultant increased costs. Nevertheless, we still felt that in selected works a case could be made for its adoption and he looked forward to trying out the method in one of their Fife works. The paper focused their attention on the age old problem—were they going to go all out for complete gasification or be a dual fuel industry? With the present price of coal he doubted if they could afford to be a dual fuel industry.

In support of that, and quoting from the Scottish Gas Board financial returns for 1953-54, he pointed out that in one undertaking of 378,000 therms supplying all Tully gas, working results showed a cost into holder of 0.59d. per therm above the Board's average, while similar sized and some larger works with vertical retorts were above that. The low thermal value might, in some cases, give rise to distribution difficulties but this was not so in every case. The cost of distribution in the undertaking referred to was actually 0.31d. per therm lower than the Board's average.

Evidence today showed that, both abroad and in this country, greater attention was being directed along lines of complete gasification, with particular reference to gasification units operating under high pressure of 20-30 atmospheres. Indeed, a paper had recently been given by Dr. Dent to the British Association meeting on that very subject, with particular reference to the Lurgi plant. Already sufficient evidence existed to show that the manufacture of town gas by Lurgi plants, either from deep-mined coal or opencast coal with a

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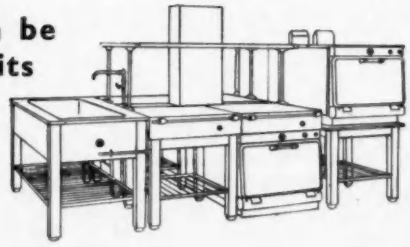

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high ash content of 25%, could be carried out, and that the gas produced from large units with that method of manufacture could compare favourably with present-day orthodox manufacturing carbonising units.

When one considered that capital commitments for that new type of plant based on large undertakings were less than one half what they would be with present day carbonising plants, it was obvious that that field would open up new prospects which could not be ruled out of future consideration. It might well be that the answer to the problem lay in a mixture of units; the best types of coking and semi-coking coal going to base load orthodox carbonising units, and the poorer qualities being used in complete gasification plants.

Increased Flexibility

Mr. F. Oliver (Johnstone) said the future of the industry would appear to lie in their ability to use an ever-increasing amount of lower rank coals so that, if any further increases did occur, they would find themselves running parallel to their competitors or even gaining ground relatively, rather than experiencing the reverse, as was the case at present. Mr. Poulson's figures were not at all encouraging, especially after the publicity which had attended the recent experiments south of the border, but he felt that every therm of gas which could be produced from low rank coals and every ton of high grade coke that could be saved at the expense of low quality coal was helping them to achieve some measure of success. For that reason they should press on with experiments to produce gas by injecting complete gasification gas at the base of the retorts and even consider the possibility of using complete gasification gas to produce the heating in the combustion chambers of the continuous vertical retorts. It would give increased flexibility and help to counteract any changes in the coal to coke price ratio and the current price of oil.

Mr. Poulson had stated that 'the gas industry was paying a high price for its coal and it was surely entitled to receive those qualities best suited to it; that was the first step towards the production of a cheaper therm.' While that statement was correct he should have been able to say— 'The gas industry is already paying more than it can afford for its coal and it should benefit financially by utilising the more abundant supply of lower rank coals and releasing the higher quality coals for the export market.' When reading the paper the first simple thought which came to his mind was—if the carrier gas process was involved 30 years ago, why was it not continued? He realised that capital costs were much less.

Mr. J. Foster (Largs) said that at Largs they experienced considerable peak loads in the summer months, and, while they had ample plant capacity meantime, Mr. Poulson's paper showed how these seasonal peak loads could be met, instead of by extension of retorts, and where there was no further space for more plant. They had no water gas plant, and he would like to ask if this could be done satisfactorily by using ordinary producer gas, and how much extra output could be obtained if ever this were necessary? Would the present gas offtake pipes be large enough to take the additional gas?

Mixing of Coals

Mr. W. Stewart (Armadale) said he had been interested in the mixing of coals, and the results to be expected by the various mixtures, and had studied various literature outlining the behaviour of coals during carbonisation, both in connection with gaseous output and class of coke produced, a subject of absorbing interest. He would suggest that much more attention could be paid to the insulation of settings brickwork. They had been able to reduce heat losses considerably in that way, and he would like to have Mr. Poulson's views on that.

Mr. G. E. H. Keillor (Airdrie) said he had studied the reports on the gas injection process with great interest and in the course of checking up on some points in Professor Lewes' 'Carbonisation of Coal,' originally printed in 1912, he had found detailed results of the effects of passing B.W.G. through horizontal and inclined retorts. Professor Lewes described the benefits derived from the purging and shielding action of the carrier gas and went on to suggest that water gas should be blown into the base of the vertical retort. He considered that 40% could be added without reducing the mixed gas below standard requirements. At that time he did not think steaming was recognised, nor was it necessary, as the retorts were air-cooled at the base. It had been suggested by Mr. Haynes that the process should be tried at lower temperature; he had also suggested the possible use of a metal retort. Bearing in mind the advantages to be got when degradation of the valuable primary products of coal distillation was minimised and the possible fuel economy inherent in lower temperatures, he liked Mr. Haynes' suggestions.

With gas injection it was clear that no miracles occurred. The primary products of distillation were probably retained in their low temperature characteristics in greater degree than in steamed vertical retorts because of the shielding effect of the carrier gas and the reduced time contact owing to the doubled volume and therefore doubled velocity of travel. Distillation gases evolved from the underside of the plastic layer were diluted with the carrier gas and for the most part would travel up the retort walls and through the hot coke below and outside the plastic layer. If that was so, the hot carrier gas was wasting a good deal of its effectiveness since it was bypassing the raw coal. Further development might benefit from study of John Roberts' researches which stressed the need to eliminate the plastic layer during carbonisation, and if this could be done in conjunction with the gas injection process, there would be a free passage for hot gases up through the centre of the charge and away from contact with the hot walls of the retort. This should increase the effectiveness of the carrier gas. The use of suitably blended small coals or agglomerating smalls might bring this about, or else a pre-treatment of coking smalls somewhat as described by the author at the end of his paper.

Effects of Steaming

He wondered whether the humidity of the injection gas had been under control during the experiments; also whether trials might be carried out with high humidity which would be equivalent to a combination of the steaming and gas injection processes. Elimination of the plastic layer could be expected also to give better results with the steaming process from which they were inclined sometimes to expect too much. Up to 10% steaming there was very little waste of steam, but at 20% steaming one-third of the steam might be undecomposed and, therefore, to get the effect of 20% steaming over 30% would have to be blown into the retorts. He had an idea that the starting point, or so-called straight coal gas yield, in a vertical retort was well below that of a horizontal retort and with present day Scottish coals might be in the region of 8,000 cu.ft. per ton of 625 B.Th.U. gas, equal to 50 therms. He would welcome information on that point, but the assumption he had made would account for their inability to obtain the high yields of gas indicated by steaming curves at the lower calorific values. Mr. Poulson now wisely discounted these in his paper and it might well be time for recasting the well-known 'steaming curves' to a steeper downwards angle and starting off from a yield which had more of the characteristics of low temperature distillation. Possibly there should be a set of curves for each different rank of coal.

In the author's comparative cost tables based on various calorific values he did not see an item for the cost of steam, which, if omitted, might show the lower values in too favourable a light. It might be that the plant was expected to be self-supporting in steam at all calorific values, but even then there must be some adjustment required for surplus steam at the higher values. The difference in steaming between 500 and 400 B.Th.U. would require about one-third of a cwt. of boiler fuel per ton of coal carbonised, with a cash equivalent of several thousands of pounds. The re-allocation of coal supplies so as to give each plant a steady and satisfactory blend was a point well made by Mr. Poulson and of itself might easily save his farthing a therm. The mixtures received at Airdrie could only be conceived by someone completely ignorant of coal qualities and carbonising technique. How could one adjust plant when coals of 4 to 7 coking index were sandwiched with those of index 1? Something could and should be done about that without delay. That was not an airy theory. It was eminently sound and practicable; it was a fuel saver; it helped the plant and the operators; and it could not fail to improve results and save money. The present steaming process might be supplemented by the injection of oxygen. The oxygen would make good the heat now absorbed by the water gas reaction and they would then have the possibility of complete gasification in one vessel. Mr. Poulson had reminded them that decomposition of coal required little heat and since they were now on the threshold of the secrets of internal heating there might be hope of epoch-making changes for the benefit of the industry at a crucial time in its history.

Mr. Poulson Replies

Mr. Poulson, replying to the discussion, said he was pleased to note Mr. McFadyen's agreement in respect of the gas quality of 425 B.Th.U. advocated in the paper. Answering Mr. McFadyen's question about the quality of 450 B.Th.U., at which the tests were conducted, he explained that surplus gas from the test plant was fed into the Manchester mains, where the quality is 450 B.Th.U. Any reduction in quality had to be made up by butane or propane enrichment. If 425 B.Th.U. gas was made, as the finished gas, more blue water gas would be added. Something like 13,000 cu.ft. carrier gas would be added per ton of Lanarkshire coal carbonised, as against 11,000 cu.ft. added for 450 B.Th.U. gas. The additional injected gas would further increase the nominal

throughput of the retorts, say from double throughput with 450 B.Th.U. gas, to about 2½ times when making 425 B.Th.U. gas. But the results on 450 quality shown in the tables might be taken to form a near balance sheet in comparison with present results with the steaming process.

Maintenance costs would be lower with carrier gas as fewer retorts would be used, but a maintenance charge would have to be put against the water gas plant. On the question of life of refractories, experiments indicated that retort life would be increased, due to increased scurf formation at the top of the retort, and reduced brickwork deterioration at the bottom of the retort with the absence of steam. But this would apply more to English coals than to Scottish, where long retort life was already obtained. Retort life with Scottish coals was dictated mainly by abrasion and wear of the retort walls, and scarcely at all by chemical attack and erosion. He was asked to put a figure on increased retort life, which he would put no higher than 10% to 15%, considering the present long life, and this on a coal tonnage basis, rather than on working days.

Additional Tar

Additional tar, he continued, was formed by the carrier gas process, about 4 gal. per ton, which he agreed would be better converted to gaseous therms, and it was hoped that it might yet be possible to do so, though it did present some difficulty since the additional tar was formed consequent on the lower temperature within the retort, caused by the higher coal throughput. Thus there was less cracking of the light tar oils, and also the ascending carrier gases, containing a higher percentage of hydrogen, tended to increase the formation of condensible hydrocarbons.

Using Scottish coals the extra coke amounted to 0.5-0.8 cwt. per ton of coal carbonised, depending on the efficiency of blue water gas production. It could, quite conceivably, be lower, and a further point to observe carefully was that the additional weight of coke was of large size and not of the small fractions which would command only a lower price, thus emphasising the necessity for the water gas plant to gasify the lower coke fractions. Cost of gas into holder by the carrier method depended largely on the quantity and also on the size of coke available for sale, and the additional amount of labour employed in the combined process.

Replying to Mr. Jamieson on the question of thermal output of plant, Mr. Poulson said that with average Scottish coals, the figure he would suggest with the steaming process and 25 ft. retorts would be eight therms per inch of major retort axis, so that with a 44 in. retort about 350 therms per day could be expected, and this would provide a good optimum figure for thermal output of carbonising plant in Scotland. With regard to the comparative danger between the carrier gas method and the steaming process, experiments indicated that there was little additional danger with gas injection provided certain precautions were observed which included tight retort brickwork, the top and bottom ironwork must be tight, water sealed doors were essential, and there must be an automatic steam purge coming into operation a minute before the dicharge door was opened, and continuing for a minute after it was closed, which also had the advantage of regularising governing conditions of the plant when the carrier ga s was shut off. More technical supervision was necessary with the added gas process. The extent depended on size of works and amount of supervision already available, but in the smaller works, such as they knew in Scotland, where the foreman or even the stoker, was responsible for retort house operation, more supervision would be needed, as the time lag of operation was shorter with the carrier method. For instance, if the added gas should suddenly cut off for some reason or another, 'green' coal would be discharged, with its attendant difficulties.

Air Admission

The position in respect of plant beyond the retort house using carrier gas would be that the existing condenser area would be sufficient, on the basis of ton of coal carbonised, as the gas leaving the retorts was at lower temperature. The same would apply to washers, and the purifiers might go slightly longer. The air admission would be about 1% less than with the steaming process. When considering the installation of new carbonising plant with the carrier method, each set of conditions must be carefully weighed, as it could well be, where no water gas plant, or relief holder existed that the capital cost of the combined process could be higher. With the carrier method the additional plant required would be equipment for gas supply to retorts, a water gas plant, and if the process was to be continuous, a standby water gas plant would be preferable, also a relief holder. The pressure it should throw would be normal when treating Scottish doubles and trebles, but where run of mine coals were used, heavier holder pressure would be necessary to overcome the additional density of the charge, and the higher resistance caused by the denser plastic layer.

Regarding the admission of oxygen at the base of the retorts Mr. Poulson said that straight oxygen injected into the retort could provide heat internally, sufficient for the process of distillation with little coke fed to producers, and hence saving of coke. A mixture of oxygen and steam could produce sufficient carrier gas volume at the base of the retort to effect a useful increase in coal throughput. Mr. Jamieson's suggestion provided a direction in which much further interesting experiment could be undertaken to assess the economics of its use.

Complete Gasification

Concerning complete gasification, Mr. Poulson felt that any discussion on the Lurgi plant must begin with a compliment to Dr. Dent and his colleagues for the considerable research they had put into the process, but operational costs appeared still to be against them, particularly in respect of price of oxygen, and, unless for reasons of national urgency and the utilisation of an otherwise waste product, there would seem to be little virtue in putting cheap coal through a dear process, and they must first assure themselves that this low grade coal was cheap. It seemed to him that the gas industry was evolving and developing new processes to upgrade coal. They were already treating the lower ranking coals more efficiently, while paying high ranking prices for them. Coal containing 25% ash would be unprofitable in any process of distillation unless purchased at a very low price.

In reply to Mr. Oliver, Mr. Poulson remarked that there would be general disappointment in the fact that coke qualities were not appreciably improved when using the carrier method with Scottish coals. Earlier it was hoped that improvement would be possible with that method, but on further reflection, and confirmed by the recent experiments, there was no scientific reason why it should be improved as size and properties of the coke were a function of the coals used. The carrier gas did nothing to the coal or to the coke to improve either its caking ability or its combustion characteristics. It served merely as heat interchange from the coke at the base of the retort to the coal at the top of the retort.

Referring to the use of carrier gas at Coatbridge 30 years ago, the object was to increase the nitrogen content of the liquor to increase sulphate of ammonia production, for which a high price was then being obtained. On this, their own experiments showed that, with carrier gas, less liquor was produced, but substantially the same nitrogen content was contained in the smaller volume of liquor per ton of coal carbonised, thus forming a stronger solution. The carrier gas process at Coatbridge was discontinued, in the author's view, because of the economics at that time, since a coke expenditure of 60 lb. of coke was then necessary to produce 1,000 cu.ft. of blue water gas. Today only 33 lb. was needed. It was also necessary to use the larger coke fractions at a time when the price differential between coke and coal was wider than today. On the question of the steaming curves applying to Ayrshire coals, Mr. Poulson considered that these coals could, in general terms, be placed on the same curves as Fife and Lothians.

With regard to the radiant heat process, the size of coal used, in recent experiments, passed through a 32-mesh, and the coal was raised, in the first stage, to a temperature of about 400°C. The size of the smokeless fuel produced in these experiments was 1½ in. cube, though this could be varied widely to suit the local size demand, as also could its density, by varying the briquetting pressure. Answering Mr. Foster, the author stated that where no water gas plant existed, as at Largs, and considering their high peak load over brief periods, producer gas would certainly be the cheapest and most satisfactory way of applying the carrier gas method, provided the quantity injected did not exceed 20% of the total gas made. To exceed this would adversely affect both the specific gravity and the composition of the finished gas. Mr. Poulson suggested applying carrier gas to, say, two retorts, from which an equivalent output of three retorts would be obtained. An increase of one retort did not seem much, but where holder stocks were high at the beginning of the week and fell considerably by mid-week the assistance of one additional retort during the intervening days would get many smaller works over their peak load difficulties. The existing top fittings and gasways would be sufficiently large to cope with the additional gas, as this would mainly be a condition of governing.

In reply to Mr. Keillor, Mr. Poulson agreed that in certain instances there was over steaming. The steam valve had always been a ready means in the endeavour to increase gaseous thermal output, but this could easily have the reverse affect. In cases of oversteaming it was probable that the plant engineer was operating to steaming calculations compiled 30 years ago when coke quality was much higher. As steaming took place only on the outer surface of the coke, the present higher ash

content 'blinded' the carbon surface and the effectiveness of steaming was thereby reduced.

With regard to the cost of steam in the paper, steam had been allowed for by the reduced amount of saleable coke, as the gas qualities decreased. For instance, 10.2 cwt. of saleable coke was shown at 500 B.Th.U. gas quality, whereas only 7.2 cwt. saleable coke per ton of coal carbonised is shown at 400 B.Th.U. gas quality. The reduction of almost 3 cwt. saleable coke per ton of coal carbonised covered the increased requirements for steam to retorts, works process steam, and additional coke to producers, at the lower gas qualities. He was glad to note Mr. Keillor's agreement on the narrowing of the variation of coal qualities delivered to each works, and with regard to the admission of oxygen at the base of the retort, mentioned earlier by Mr. Jamieson, this seemed to offer an interesting and wide field for further experiment.

Replying to Mr. Stewart the author said that several eminent authorities had stated their views on the mechanics of coal carbonisation. Many of these authorities differed in their opinions, but all were agreed that much more research on this complex subject would be to the considerable benefit of the gas and coking industries alike. On the subject of insulation of retort benches, he agreed that marked savings in fuel could be attained in this way. Plant designers were paying the closest attention to this feature, as for instance the balanced heat setting, where the producer gas was admitted at both sides of the setting, thereby considerably reducing radiation losses, with consequent saving of fuel charged to the producers, which was the foundation of low gas production costs.

Mr. D. C. Elgin (Chief Technical Officer, Scottish Gas Board) in a written contribution states:

Although the title of Mr. Poulson's informative paper perhaps suggests that a good deal of it will have a purely local application, I am certain that our colleagues outside Scotland will not fail to recognise that the coal situation here, although still declining, has for many years presented those very problems which are now causing apprehension at many works served from English coalfields. Gasworks in the east and south-west of Scotland have for long utilised coals with swelling numbers of 1½ and less. Of course, there were localities such as Lanarkshire where coals with swelling numbers in excess of three were traditionally available to gasworks in substantial quantities, but many of those have now been bracketed with the subjects traditionally reserved for coking purposes. In other coalfields, however, a long-standing predominance of rank 700 coals has now made way for ranks 800 and 900.

Coke Quality

Coke consumers here have long been accustomed to a product which is more friable and less attractive in appearance than the average English coke, and these attributes have been accentuated by the undoubted retrogression in coal quality in recent years. The effect on coke sales here may have been mitigated a little by the continuous and steady nature of the fall in quality over a number of years, and by the increasing attention given to coke preparation at several places; but I am certain that a sudden change from, say, Yorkshire coals to ranks 800 and 900 would arouse a storm of protest with immediate reflection on coke sales.

As Mr. Poulson's paper rightly suggests, the continuous vertical retort has certainly stood the test of inferior coals from the gas production point of view, but under these conditions the coke is hardly the independent smokeless solid fuel 'produced by scientific means' of which Mr. Poulson speaks; it becomes more and more the unhappy victim of circumstances.

Coupled with the friability of the coke is the problem of high breeze production. As is suggested in the paper, these characteristics demand efficient screening combined with debreezing. This immediately produces a larger quantity of breeze for disposal as such, and we are plunged between the stools of technical integrity and economic expediency.

Superficial Advantages of Poor Coals

Some of the other attributes of the low-rank coals found in Scotland would superficially appear to be advantageous, but these are small compensation for the other troubles. Retort life, for instance, tends to be much longer than with rank 500/600 coals, partly because scurf deposition is less pronounced. It is usual for retort material to endure in a reasonable condition for perhaps three or four times the normal period in English practice. Top rodding is considerably less arduous and sometimes quite unnecessary. Re-activity of coke to steaming is vigorous, and this property is utilised by steaming down to 450, or more commonly 425 B.Th.U., thus achieving as high a gaseous thermal yield as is possible in the circumstances.

Mr. Poulson has suggested the yields to be expected from various types of coal in C.V.R. practice; he has also pointed out that higher coal throughputs are possible with the lower-rank coals. To assist in attaining the best overall financial results in utilising these coals, would the author indicate the range of coal throughputs appropriate to various sizes of C.V.R. with ranks 800 and 900 coals, also the optimum gaseous thermal output per retort under similar conditions?

Laboratory and Operation

Reference is made to the correlation of laboratory scale coal tests with operational results. This has always been a debatable point, and success seems to depend on the accumulation of local experience in obtaining and interpreting results. I understand that the continental Jenkner test rules out many of the divergencies between the laboratory and works practice, giving particularly valuable prediction of coking behaviour. Regarding the consumption of producer fuel when low-rank coals are being carbonised, I should like to have an indication of the way in which the increased reactivity of the coke on the one hand and the relatively high ash content on the other hand have affected the producer design, with particular reference to capacity. Fortunately the ash from most of these coals does not fuse until a relatively high temperature. How do these factors affect operation of small mechanical producers?

The tests on gas injection were apparently confined to one rate of carrier gas admission for each type of coal. Why were these particular rates chosen, particularly as the calorific value of the mixed gas produced was comparatively high by our standards here? What would have been the relative effect of the gas injection process operating to give a calorific value of 425 B.Th.U., the quality which Mr. Poulson prescribes elsewhere in the paper as optimum for our low-rank coals under normal conditions?

The coke analyses and sizing tests are interesting, but they do not appear to have established a trend. Perhaps the effect of the injection process on coke production is not appreciable when graded coals are being treated except, of course, in eliminating surface degradation. Has Mr. Poulson carried out any tests on the effect of gas injection on the caking of similar coals and slacks?

Reply to Mr. Elgin

In reply to Mr. Elgin, Mr. Poulson writes:

When making 425 B.Th.U. gas, with average Scottish doubles, the coal throughputs per day would be—33 in. retorts, 3.6 tons; 40 in. retorts, 4.3 tons; and 50 in. retorts, 5.3 tons.

With regard to producer design, the general tendency with the step grate type has been to increase their size to cope with higher ash content. The leading factor in efficient producer operation is the flare bed temperature, being about 1,000°C., with Scottish coals, which, in turn, is largely dependent upon correct grate area; and this may be taken with average Scottish cokes as 1 sq. ft. of grate area per 2 tons of coal carbonised per day.

Scottish cokes are well suited for use in mechanical producers, and the increased ash formation with reduced clinker formation is readily dealt with by minor grate adjustment.

With regard to the tests on gas injection and the rate of carrier gas admission for each type of coal, the gas injection rates shown are determined, rather than chosen, by the type and quality of the coal in order to obtain the desired finished gas quality. It was necessary, under the local conditions prevailing, to produce as near as possible a 450 gas, but if this quality is reduced to 425 B.Th.U., the blue water gas injection rate would be increased by 15 to 20% in each instance, to effect the necessary dilution and gas quality reduction.

GAS STORAGE

Die Gasspeicherung (Gas Storage).—By Dr. Fritz Wehrmann. Published by R. Oldenbourg, Munich, 1954, 164 pages, 118 pictures. 28.—DM.—The book gives a broad review of the gas storage technique in Germany with some remarks about the differing practice in other countries. First a short chapter is devoted to why gas has to be stored. There follows a short historical sketch and a treatise on the proper sizing of gasholders. The main part describes the construction of the different systems—the old type of wet holder, the spirally guided holder and the dry holders for low and high pressure. A critical comparison of the different types and a review of the safety rules conclude the book. The writer is a practician, who has given much thought to the problem during his long career as gasworks engineer. The reference to the German literature in footnotes are quite complete, whereas not much account has been taken of foreign literature. German standard specifications are given in their proper places in footnotes. Statical problems are treated only on general lines. Whoever wants to be informed about the status of German gasholder technique will find the book a valuable record.—J. K.

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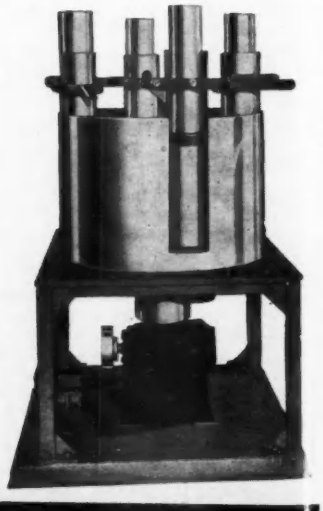

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Institution of Gas Engineers

Results of 1954 Examinations

The following examinations were conducted by the Institution of Gas Engineers in the Session 1953-54: (a) Diplomas in Gas Engineering (Manufacture) and Gas Engineering (Supply); and, (b) Associate Membership Examination (jointly with the Institution of Civil Engineers; both these examinations were in accordance with the Education Regulations 1953 Revision of the I.G.E.) (c) Principles and Practice of Gas Salesmanship for the Certificate in Gas Salesmanship and Consumer Service.

The names of the candidates who have qualified for the award of certificates under (*a*) and (*b*) are given below and those qualifying under (*c*) will be published later after the oral examinations have been conducted.

DIPLOMA EXAMINATIONS

Gas Engineering (Manufacture)

Mather, L. R.	Huyton
Ogden, K. G.	Halifax

Gas Engineering (Supply)

Kendall, C. R.	Leicester

ASSOCIATE MEMBERSHIP EXAMINATION

Gas Engineering (Manufacture)

Hempenstall, G. T.	Barrow-in-Furness
Waple, E. R.	London

Gas Engineering (Supply)

Scrace, R. J. W.	Brighton

The following list comprises the names of candidates who, having previously passed the main subject examination under the old Regulations, have now qualified for the award of certificates by completing outstanding ancillary subjects.

HIGHER GRADE EXAMINATIONS

External Candidates

Gas Engineering (Manufacture)

Class	Name	Town
Second	Davy, V. P.	Cardiff
,,	Helliwell, D.	Sowerby Bridge
,,	Taylor, D.	Harrogate

Gas Engineering (Supply)

Class	Name	Town
Second	Baker, C. T.	Stirling
,,	Brooks, D. E.	Liverpool
,,	Chapman, E.	Stockton-on-Tees
,,	Cooper, E.	Caerphilly
,,	Crewdson, S. A.	Bradford
,,	Daniels, E. W.	Southport
,,	Hamilton, R.	Wallasey
,,	Soper, D. C.	Blackburn
,,	Southwell, F. D.	Glasgow
,,	Southworth, J.	Prescot
,,	Spelman, A. W.	Wrexham
,,	Thomas, W. G.	Liverpool

Internal Candidates

Gas Engineering (Manufacture)

Class	Name	College
Second	Fleming, R.	Rotherham
,,	Trevor, J. N.	Manchester
,,	Waddle, J. G.	Newcastle-on-Tyne
,,	Watson, T. C.	Birmingham

Gas Engineering (Supply)

Class	Name	College
Second	Eccles, G.	Bradford

ORDINARY GRADE EXAMINATIONS

External Candidates

Gas Engineering (Manufacture)

Class	Name	Town
First with Distinction	Clayton, N.	Darwen
Second	Davy, V. P.	Cardiff

Gas Engineering (Supply)

Class	Name	Town
Second	Clayton, N.	Darwen

The following is taken from the Report of the Board of Examiners.

During the year 1953-54 the members of the Board, appointed by the Council of the Institution were for the Major Courses.

S. L. Wright, B.SC. (Cardiff); F. S. Charnley, M.ENG. (Birmingham); L. G. Townsend, M.SC. (Birkenhead); J. K. Mitchell, B.SC.(ENG.) (Dudley); J. A. Tomes (Stourbridge); A. F. Grant, B.SC.(ENG.) (London); R. Whiting (Ipswich)—Gas Engineering (Manufacture).

L. S. Crowle, B.SC. (Cheadle Hulme); A. J. Skinner, M.C., B.SC.(ENG.) (London); F. Harvey (Walsall); W. Johnson (London); A. V. Horsfall (Birmingham); D. R. Wills, B.SC. (London)—Gas Engineering (Supply).

Since the cessation of the Ordinary and Higher Grade Examinations in 1953, the activity of the Board of Examiners has been confined to the marking of theses submitted by candidates for the Diplomas in Gas Engineering (Manufacture) and (Supply), the oral examination of these candidates, the setting of the papers in Gas Engineering (Manufacture) and (Supply) in Final Part II, Group VIII, of the Associate Membership Examination, and the marking of answers submitted to these papers.

It is expected that for a few years the number of candidates is likely to be small; nor will it ever reach the comparatively large figures characteristic of the last few Higher Grade Examinations, in which unfortunately quality lagged considerably behind quantity. There are a number of reasons for the much smaller entries expected for the Associate Membership Examination, among which the following may be cited:

(i) The standard of the Associate Membership Examination is considerably higher than that of its predecessor and is beyond the capacity of many who attempted the Higher Grade Certificate. For these, the examinations in Gas Technology (Manufacture) and (Supply) of the City and Guilds of London Institute are more appropriate, and, indeed, it was primarily to cater for their needs that these certificates were introduced.

(ii) By far the larger proportion of candidates for the Associate Membership Examination are studying by means of national certificate courses and will not be ready to sit for the examinations in Gas Engineering (Manufacture) and (Supply) for a year or two.

(iii) A larger number of graduates with academic qualifications, which are themselves sufficient to satisfy the relevant clause of the by-laws relating to Associate Membership, are being recruited to the industry. Accordingly, a larger proportion of Associate Members, who have not passed through the Institution's Examination Scheme, are being elected. This is a result of the increased facilities for further education now generally available and has affected a number of professional Institutions in a similar manner.

The Board of Examiners is, therefore, not unduly worried in regard to the small number of entries during the current year, particularly since, in spite of the absence of any outstanding candidate, the general standard was not unsatisfactory. Notwithstanding the small

GAS ENGINEERS AT OIL REFINERY

Following their annual general meeting at Swansea, the members of the Wales and Monmouthshire Section of the Institution of Gas Engineers were the guests of the Anglo-Iranian Oil Company on a visit to the National Oil Refineries at Llandarcy. The plant is capable of handling 4 mill. tons of crude oil annually, and is one of the three major refineries in Great Britain which today makes the Anglo-Iranian Company the largest refining organisation in the country. This photograph, with Mr. J. H. Chapman, the newly installed Chairman, in the centre, was taken by Major W. S. Bryan, who conducted the party round the refinery. In the background is one of the fleet of tankers which bring crude oil to Llandarcy. The oil is piped direct from the ship to the refinery tanks.

number of candidates coming forward, the Board has in no way curtailed the procedure for the setting of papers or the marking of scripts.

Four candidates submitted theses for Diplomas, three in Manufacture, and one in Supply. The observations of the Examiners on these theses are given below:

Diplomas in Gas Engineering (Manufacture): Three candidates submitted theses for the Diploma in Gas Engineering (Manufacture), the titles being 'Application of Economy on a Medium Sized Gasworks', 'The Function of the Gas Industry in a National Fuel Policy', and 'Recent Experiments with Creosote Oils in the Manufacture of Carburetted Water Gas'. The theses showed a reasonable standard of technical knowledge, but candidates must give more evidence of individual thought and approach if first class awards are to be obtained. The three candidates were orally examined by the Manufacture Panel of the Board of Examiners and as a result of these examinations, considered in conjunction with the marking of the theses, two were awarded Diplomas and one was failed.

Diploma in Gas Engineering (Supply): One thesis, entitled 'The Planning, Design, and Construction of a Divisional Gas Grid', was submitted. The presentation of this thesis was commendable. The general planning problem was well stated and the statistical approach in the evolution of the design load was noteworthy.' On the other hand, some of the conclusions reached on consideration of the data submitted appeared to be somewhat arbitrary and to lack confirmation by supporting experiments or information. The candidate was orally examined by the Supply Panel of the Board of Examiners and as a result of this examination, in conjunction with the quality of the thesis, was awarded a Diploma.

Associate Membership Examination: Final Part II, Group VIII, Gas Engineering (Manufacture) and (Supply): In October, 1953, one candidate entered in Gas Engineering (Manufacture), taking both papers, in each of which he secured a pass. There were no candidates in Gas Engineering (Supply).

In April, 1954, two candidates entered for the examination in *Gas Engineering (Manufacture)*, each taking both papers. Both candidates obtained passes, but for the benefit of future candidates it should be noted that it would have been possible for the Examiners to award higher marks if the candidates had matched their knowledge of gasworks processes with an ability to marshal that knowledge when answering examination questions. Practice at answering questions and particularly in setting out discussions and statements in logical form as well as practice at making sketches should form an essential part of a student's preparation for examination. In his Presidential Address at the 91st Annual General Meeting of the Institution, Mr. John T. Haynes stressed the desirability of gas engineers being trained to be cost conscious. The Board of Examiners has tried to foster this trend by including reference to costs in questions set to candidates in accordance with the syllabus of the Associate Membership Examination. Those who are responsible for the employment of candidates for Associate Membership of the Institution can play an important part in this training.

Also in April, 1954, two candidates entered for the examination in Gas Engineering (Supply), each taking both papers. One candidate passed. The requisite number of questions in each paper were answered and there is no evidence that any difficulty was experienced in completing answers in the time allowed. Whilst the answers given showed in general a good knowledge of book work, the Examiners were left with the impression that the candidates had very little practical experience of the various subjects. Such sketches as were made were poor, and in some cases crude. Once again, candidates lost marks on some answers because they failed to read the questions carefully.

Charles Hunt Memorial Medals: No candidate in the 1954 Examinations obtained a standard sufficient for the award of either of these Medals.

Big W.G.F. Meeting at Buxton

Nearly 700 members of the Womens Gas Federation from all parts of the north west attended a conference on September 30, at Buxton, at which Dame Vera Laughton Mathews presided. The Mayor of Buxton extended a civic welcome and officially opened the conference. He was supported by the Mayoress, and the Mayoresses of five other towns in the north west: Macclesfield, Stalybridge, Middleton, Burnley and St. Helens.

On the platform also were Mr. D. P. Welman, Chairman of the North Western Gas Board, and Mrs. Welman, Lady Hamilton (North West Divisional Director of the Women's Voluntary Service) Miss J. Frith, O.B.E. (Organising Secretary of the W.G.F.), Mrs. T. Kenworthy (Chairman of the Stalybridge Division), and Miss Hilda Swindells, Chief Home Service Adviser.

Talks were given by Mr. D. P. Welman, Mrs. Moreton-Pritchard, of Good Housekeeping Institute, Dame Vera Laughton Matthews, Mr. Ronald Paterson, the well-known dress designer, Lady Hamilton, and Miss Patricia Laffan, the screen star.

Mr. Welman said that by lending their support to the gas industry members of the Federation could pride themselves on rendering a real national service. They were actively helping the country's economy by so doing. 'Apart from the traditional skill and inventive genius of its people' said Mr. Welman, this country has only one real source of wealth. That is its coal. 'In so far as the Women's Gas Federation supports the gas industry you encourage the most economical utilisation of that one source of wealth; indirectly also as your interest leads to increased sales of gas and gas appliances so you help to keep down and eventually to reduce gas and coke prices.'

Dame Vera Laughton Mathews gave a glimpse of what had taken place behind the scenes in the recent International Kitchen exhibition at Olympia. Not only, she said, was this one of the most colourful demonstrations of the pre-eminence of gas for every kind of cooking ever staged; it had also proved to be valuable means of promoting goodwill among the womenfolk of many nations.

Mrs. Moreton-Pritchard, Senior Lecturer of the Housekeeping Institute, explained the work of the Institute, and Mr. Ronald Patterson spoke on 'New Dress Design.' His talk was illustrated by a mannequin display.

Lady Hamilton explained the work of the Women's Voluntary Service.

Dame Vera Laughton Mathews, who presided at Buxton, with Mr. and Mrs. D. P. Welman.

Another Collier Launched

The twenty-ninth vessel for the North Thames Gas Board's fleet, the steam collier *John Orwell Phillips* (4,600 tons deadweight) was launched on September 27 at Sunderland by Wm. Pickersgill & Sons, Ltd. The naming ceremony was performed by Mrs. John Grimston, sister-in-law of the Earl of Verulam, a member of the Board.

At a reception after the launch Lord Verulam handed the builders a cheque for £48,100 which he said was 20% of the total cost of the ship. He added that the vessel, named after a former General Manager and Secretary of the Gas Light and Coke Company, would carry coal to the Thames from north east ports and 'unfortunately across the Channel, because there is not enough coal available from Britain.'

He pointed out that the Board used 4.8 mill. tons of coal a year and 24.4 mill. gal. of oil and this produced 420 mill. cu.ft. of gas a day which was supplied to 2 mill. consumers in the Board's area.

The machinery for the *John Orwell Phillips* will be built and installed at Sunderland South Docks by the North Eastern Marine Engineering Co. (1938), Ltd. This will be the eighty-fifth ship they have fitted with engines for Stephenson Clarke and Co., the managers of the vessel.

Among those also present at the launch was Mr. E. Crowther, Chairman of the Northern Gas Board.

Seven hundred and fifty-four members of National Benzole Co., Ltd., have received awards in the National Safe Driving Competition for 1953, results of which have now been released. This figure, which is 90% of those eligible for awards, shows an improvement of 5% on last year's figure. The Royal Society for the Prevention of Accidents organises the competition.

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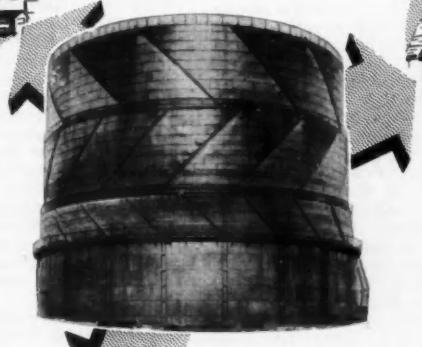

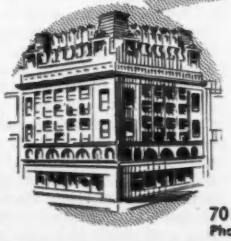

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Gas Consultative Councils

SOUTH EASTERN

Committee Called Again

Asking for a reference back of recommendations of the Industrial Committee of the South Eastern Gas Consultative Council, a member of the Council suggested that a deputation to the Committee 'may not have had all the consideration which the Council had anticipated.' Councillor H. L. Gibbs, at the Council meeting at Brighton on September 7, formally moved that the Industrial Committee be called to meet again.

The Chairman, Councillor A. B. Constable, had referred to minutes of a meeting of the Industrial Committee and said that although at this meeting there were sufficient to form a quorum, three of the eight members were absent owing to unavoidable circumstances.

Councillor Gibbs said that without wishing to be critical of the recommendations of this Committee, he felt there were grounds for asking for a reference back of its report, if only for the reason that several members of the Committee were absent. He thought that the deputation representing certain fish friers might not have had all the consideration which the Council had anticipated. His resolution was made with a view to confirming recommendations already made or giving the matter further consideration.

The proposal was seconded and the Chairman said that one member of the Committee, Mr. Mathews, had indicated that he had another matter to raise if there were a further meeting. What this matter was, Councillor Constable did not say.

Another member felt that if the Industrial Committee were not given some indication of why this report was being referred back, it might well be that the Committee would arrive at exactly the same conclusion as before.

Councillor Constable: The deputation's main point is that only 32% of fish friers benefit under the new tariffs and 68% are worse off. This aspect might with advantage receive more detailed investigation.

In defence of the Committee, Mrs. D. N. Rathbone, Deputy Chairman of the Council, said it was only fair to say that a great deal of consideration had been given to the case put forward by the deputation. Also, this deputation already had several interviews with Board officials and if concessions were made to one section in industry it must be to the eventual disadvantage of other consumers. She supported, however, the suggestion for a further meeting.

On the subject of the Council's recent resolution relating to increases in the price of coal, the West Surrey District Committee submitted a recommendation to the effect that, having received a reply from the Ministry of Fuel and Power, the Council should pursue the matter both with the Ministry and the South Eastern Gas Board. The Ministry should be asked to explore the possibility of increasing the available supply of gas coal and the Board should be asked to continue and extend its efforts for the production of gas from alternative sources.

Commenting on this resolution, Councillor Constable said he felt it could be somewhat misleading. The Board's proposals for obtaining gas from alternative sources had already been explained in some detail by the Chief Engineer. At Hastings, plans were already in progress for the setting up of a large plant for obtaining gas from heavy oil by the 'Segas' method. This would result in a big capital expenditure reduction. In spite of the Chairman's remarks, the resolution was adopted.

SOUTH WESTERN

Status of a Museum

Is a museum an educational establishment and entitled to come within the definition of 'schools' when its gas charges are being fixed? The South Western Gas Consultative Council, which met at Taunton on September 8, said 'yes'; but the South Western Gas Board has said 'no.'

Mr. W. E. Hall, Hon. Secretary of the Torquay Natural History Society, wrote to the Consultative Council protesting against the rates charged by the Board for gas used at the museum and premises of the Society. He said that the Society was founded in 1844 and was recognised as an educational establishment by the Commissioners of Inland Revenue and the local rating authority. He asked the Council to support an application to the Board that the Society should be charged on the same basis as schools.

Miss J. Stephen (Vice-Chairman), who presided in the absence of Mr. A. W. Loveys (Chairman), said the estimated saving to the Society by the suggested change would be £25 a year. She thought the issue had to be decided on the type of establishment, rather than on the load.

The view of the Council was that the museum should be treated in the same way as a school, but Mr. W. J. Baker (Member of the Board), in his reply, had regretted that the Board could not accede to the request. He said that the special conditions, although applicable to schools, referred not to their educational facilities, but to the fact that the great majority did a great deal of catering. The schedule was provided to meet the demands of large-scale consumption, chiefly in respect of catering as distinct from normal small domestic premises; the only exceptions were premises for religious worship.

Mr. T. J. Reeves Taylor (Torquay) thought that the Torquay society, which had rooms equipped for catering, and other museums were entitled to the same consideration as schools.

Mr. Baker said if the Society could prove conclusively that a large percentage of visitors to the museum went there for organised instruction, he thought it could be classed as a school, but not if they paid or did not pay simply to look around. 'If one application were granted, every museum, library and institution of that type in the Board's area would demand the same terms and we should start a tremendous cycle.'

Several members urged that as the Commissioners of Inland Revenue and the local rating authority had recognised the museum as an educational establishment, that should be equally acceptable to the Gas Board.

Mr. Baker said that information about the percentage of visitors taught at the museum or man-hours devoted purely to instruction would be a good guide.

He promised to put the Council's views before the Board to see whether the question could be further considered and added, 'We shall have to deal with every case on its merits.'

EASTERN

The Eastern Gas Consultative Council at a meeting in London on September 20 presided over by Councillor Lieut.-Col. R. I. Musson, M.C., considered an application from a Council house tenant at Beccles, Suffolk. On being allotted a Council house in June, 1953, the tenant was given the choice of his present house supplied only with electricity or an alternative house equipped with gas and electricity services; although preferring gas for cooking he accepted the former house under protest. Subsequently he requested the local authority to afford him a gas supply, but without success. He now appealed to the Consultative Council on the grounds that a gas main already existed on the opposite side of the road, a gas service pipe was already incorporated in the foundations of his house, although not connected to the main, and that he was willing to bear the cost of the installation. As the house was situated within the statutory distance from the main entitling an owner or occupier to demand a supply of gas, the Consultative Council decided to make strong representations to the local authority to reconsider its decision and to afford a gas supply to the applicant.

A letter was received from a fish fryer complaining of the amount asked by the Board as deposit for security of payment for gas supplied. The Chairman reported that he had referred this matter to the Board and the Council having heard the correspondence considered the Board's action fair and reasonable—the Board acting within its rights under the terms of the Gas Act, 1948.

The Chairman reported he had received a letter from a consumer complaining of the amount charged for gas supplied. On investigation of the consumption he had found that the quarter's bill in dispute had been compared with the previous low quarter and therefore this could not be regarded as a basis of comparison. The regulations gave every protection to the consumer and in this case the meter had been sent for official test, when the registration was found correct. As the register of a meter is *prima facie* evidence of the quantity of gas supplied, the Board had no alternative, having regard to all circumstances, but to rely on the official test and with this the Council agreed.

Correspondence

CONSTRUCTION MATERIALS

DEAR SIR,—Will you please permit me to 'ride a hobby horse'? It is against the continued use of protected steel as, for example, tinplate and vitreous enamelled sheet, when more satisfactory homogeneous materials are available.

One manufacturer has blazed a trail (not from scratch, admittedly) in the use of aluminium alloy to replace tinplate in gas meter construction. Now the inevitable copies are appearing. While appreciating that the gas industry has heretofore got what it deserved—indeed frequently far better than it deserved—from manufacturers, is there not now sufficient new blood at the top to warrant greater initiative and real progress in industrial design?

I do suggest that non-ferrous metals, plastics and resin bonded materials invite attention. I see that polyester resins are soon to be available in this country and that motor car bodies so constructed are on trial. These materials may well be suitable for the construction of gas meters, and also to take the place of vitreous enamelled steel—a thoroughly unsatisfactory make-shift at best in appliance construction.

I appreciate that changes would involve substantial capital expenditure, but could not the boards 'father' initiative of this character as a matter of policy?

Yours faithfully,
JOHN H. DANIELS.
Engineer and Manager.
Milford Haven and Neyland.
October 6, 1954.

WHAT IS A 'PIÈZE'?

Dear Sir,—With reference to your leader in the issue of September 8, 1954, what is a 'pièze'?

An attempt to evaluate it gives a figure of 0.00755 m.m. of Hg. (para 3) or 7.35 m.m. of Hg. (para 4). Which is correct? Unless, of course, the figure 1,013 hectopièzes is really (in English) 1·013, in which case the respective figures are much nearer—namely, 7.55 and 7.35.

If so, it would be desirable, when translating French text into English, also to translate the French comma into the equivalent English decimal point if confusion is to be avoided.

However, what is a pièze, please? Its magnitude would appear to be 10,000 dynes per sq. cm. I have searched many dictionaries, both French and English, technical and non-technical, but in vain.

Yours faithfully,
FRED NICHOLLS.
Five Grange Close,
Whitley Bay.
October 5, 1954.

Mr. Nicholls is quite correct in saying that we should have translated the French 1,013 to 1.013, but the reply to the question 'What is a pièze?' is more difficult. Mr. Nicholls will find in Larousse the verb 'pièzer'='presser'—from which it would appear that the pièze is a unit of pressure. Probably 100 pièzes was equivalent to an atmosphere—or perhaps in the creation of the metric system it was put the other way—the atmospheric pressure being divided into 100 pièzes. The only unit now mentioned is the hectopièze in the form 'hpz.'—Editor, 'G.J.'

Personal

The Board of Glover & Main, Ltd., announce that Mr. W. K. TATE, M.A., M.INST.GAS E., will be joining the Board of Thomas Glover & Co., Ltd., in the capacity of Managing Director and also the Board of the parent Company. The appointment will take effect from July 1, 1955, after Mr. Tate has completed his year of Presidency of the Institution of Gas Engineers. MR. DAVID SIME, C.A., will continue to act as Deputy Managing Director of Thomas Glover & Co., Ltd.

Meters, Ltd., announce that Mr. J. L. CROSSLEY has been appointed a Director of their Subsidiary Company, Meters (Scotland), Ltd.

MR. S. TOMLINSON JONES, Manager at Stratford-on-Avon for the West Midlands Gas Board, will succeed Mr. R. A. Lane as a representative on the Borough Council for Alveston ward. Mr. Jones was the only nominee for the vacancy.

MR. JOHN D. VAUGHAN, who has been Chief Engineer of Horseley Bridge & Thomas Piggott, Ltd., since 1950, has been appointed an official director. He will now relinquish departmental duties to assist in the technical management of the Company. To succeed Mr. Vaughan the directors have appointed Mr. R. J. Fowler to be Chief Engineer.

MR. RAYMOND BEECH, Manager and Secretary of the Kidsgrove District of the West Midlands Gas Board, has retired after 35 years with the undertaking. On October 1, Mr. J. E. Stanier, General Manager of the North Staffordshire area, presented him with a clock, recalling that Mr. Beech's father and grandfather had also been associated with the undertaking. Engineers and managers from the North Staffordshire area, with other officers, gathered for the presentation in the Board's offices at Etruria.

MR. N. G. FISHER, M.A., who is at present Chief Education Officer to the City of Manchester Education Committee, has been appointed by the National Coal Board as Principal of a new staff college for the mining industry. Mr. Fisher will take up his duties early in 1955. The Staff College will provide a centre for courses and conferences for the Board's senior staff and will enable the work which has already been done in this field of management training to be further developed. MR. G. ESSAME, who has been directing the Board's existing courses, will be the Director of Studies.

SIR KENNETH HAGUE, Deputy Chairman and Managing Director of Babcock and Wilcox, Ltd., has been compelled to resign his chairmanship of its associated Company, Edwin Danks & Co. (Oldbury), Ltd., owing to pressure of business commitments. GENERAL SIR KENNETH CRAWFORD, M.C., has been appointed a director of Edwin Danks and Chairman in succession to Sir Kenneth Hague. Following a distinguished career in the Royal Engineers, General Crawford was Deputy Chief of the Imperial General Staff from 1947 to 1949 and Controller of Supplies (Munitions) in the Ministry of Supply until 1953.

Diary

Oct. 15.—LONDON JUNIORS: Presidential Address, E. W. B. Dunning, North Thames Gas Board Showrooms, Edgware Road, 6.30 a.m.

Oct. 15.—MIDLAND SECTION, I.G.E.: Autumn Meeting, 'Breeze Burning for Steam Raising,' C. H. G. Hayward, General Manager, Stoker Works, Edwin Danks & Co., Ltd., Victoria Hotel, Wolverhampton, 11 a.m.

Oct. 15.—SCOTTISH JUNIORS (WESTERN): 'Some Aspects of Gasification,' W. L. Balmer; 522, Sauchiehall Street, Glasgow, 6 p.m.

Oct. 16.—YORKSHIRE JUNIORS: Annual General Meeting, Address by A. McDonald, Bridge Street, Leeds.

Oct 19.—WALES AND MON. JUNIORS: Visit to Salford Gasworks and West's; 'Carbonisation Present and Future,' M. Sinclair Gaskill (West's Gas Improvement Co., Ltd.

Oct. 19.—SOCIETY OF CHEMICAL INDUSTRY (CHEMICAL ENGINEERING GROUP): Film, 'Corrosion in Action', Burlington House, Piccadilly, London, W.1.

Oct. 20.—SOUTHERN G.C.C. Special Meeting. Conference Room, Civic Centre, Southampton, 11 a.m.

Oct. 20.—SCOTTISH G.C.C.: 26, Drumsheugh Gardens, Edinburgh, 11.30 a.m.

Oct. 20.—SOUTH WESTERN SECTION, I.G.E.: Annual General Meeting, Bristol.

Oct. 21.—MIDLAND JUNIORS. Day visit to the works of Walker, Crosweller Co., Ltd., Cheltenham.

Oct. 21.—NORTH OF ENGLAND SECTION, I.G.E.; Joint visit with Northern Juniors to new Fishburn coke oven plant. Paper, 'Methane Drainage', by R. Richardson and J. G. Pope.

Oct. 23.—MANCHESTER JUNIORS: Annual General Meeting and President's Day, Stretford Works.

Oct. 28.—NORTH THAMES G.C.C.: Westminster City Hall, 2.30 p.m.

Nov. 2.—SOUTH EASTERN G.C.C.: Caxton Hall, Westminster, 11 a.m.

Nov. 2.—EAST MIDLANDS G.C.C.: Mansion House, Doncaster, 11.30 a.m.

Obituary

MR. VICTOR R. SILVER, Secretary of the National Smoke Abatement Society, died on September 16 after a short illness contracted while he was on holiday, at the age of 44. Mr. Silver became associated with the Society in 1946 on demobilisation from the Army, in which he had served first in the Royal Artillery and later on headquarters staff in India, where he attained the rank of Captain. He was an invaluable member of the Society's small staff during the immediate post-war years, when its activities expanded so rapidly, and he was promoted to the post of Secretary last year, being responsible for the general management of the office and many other duties. His ability and tact and his deep interest in his work contributed greatly to the progress of the National Smoke Abatement Society and his pleasant personality will be missed by his many friends in the carbonising industries. Mr. Silver leaves a widow and one son.

Dublin Gas Fitters' Visit

As part of the itinerary for their recent visit to London, 60 members and friends of the Dublin Gas Fitters Social Club, with their President, Mr. N. J. Robertson, General Manager, Alliance and Consumers Gas Company, visited Glover & Main's Gothic Works at Edmonton. Accompanied by Mr. H. Barry, Chairman of the Committee, Mr. E. Walsh, hon. Secretary, and Mr. P. Cummins, hon. Treasurer, the Club carried out a full tour of the Glover & Main factories.

The visitors were welcomed by Mr. R. G. Payne, Southern Sales Manager, R. & A. Main, Ltd., Mr. A. Raisbeck, Works Manager, Thomas Glover & Co., Ltd., Mr. G. F. Jenkins, Sales Manager, Main Water Heaters, Ltd., and Lieut.-Col. R. A. R. Fanshawe, Sales Manager, Main Refrigeration, Ltd., and started their tour by inspecting the Thomas Glover meter factory. The parties proceeded to the Main Enamel Manufacturing Co.'s factory where the guides explained the processes involved in the manufacture of enamel frit—the basic ingredient of the high-quality vitreous enamels used on Main appliances. After lunch at the Cooks Ferry Inn, the visitors continued their programme with a tour of the production departments of the R. & A. Main factory where they watched the manufacture of modern gas appliances, paying particular attention to the assembly of the No. 20 'Century' cooker.

At the end of their tour the visitors were entertained to tea in the staff canteen, at which Mr. N. J. Robertson proposed a vote of thanks to the Directors of Glover & Main, Ltd., for their hospitality, and to the staff and guides for the competent manner in which they had carried out their duties. This was the third occasion on which the club had been the guests of Glover & Main, Ltd. Each trip had been highly instructive and enjoyable.

Mr. R. G. Payne, in reply, said they were pleased to have the opportunity of showing them over their Edmonton works and he would convey to his directors the appreciation shown of their hospitality.

Wider Lorries

Mr. J. A. Boyd-Carpenter, Minister of Transport, proposes to make regulations increasing the maximum permitted overall width of goods vehicles which weigh over four tons unladen from 7 ft. 6 in. to 8 ft. A width of 8 ft. for goods vehicles is general in America and common on the Continent. Manufacturers who make goods vehicles for these and other overseas markets have long pressed to be allowed to use the greater width on home vehicles of the heavier types because in this way they can reduce production costs and so lower export prices.

The Minister is satisfied that in view of modern developments in design, including braking, the use of these wider vehicles will not detract from road safety. He has also proposed some consequential changes in the permitted lengths and laden weights of goods vehicles. The main concessions are that the maximum length of a 4-wheeled vehicle would be increased from 27 ft. 6 in. to 30 ft. to make it the same as for a motor vehicle with more than four wheels; the maximum length of an articulated vehicle would be 35 ft. instead of 33 ft.; the maximum loaded axle weights would be increased to a maximum of nine tons, where there are two wheels in line, and to 11 tons where there are more than two wheels in line; maximum laden weights would be increased to 14 tons for a 4-wheeled motor vehicle; to 20 from 19 tons in the case of a 6-wheeled rigid or articulated vehicle; and to 24 from 22 tons in the case of an 8-wheeled rigid or articulated vehicle.

After International Kitchen

International Kitchen, the impressive display arranged by the Gas Council at the Food Fair Exhibition, Olympia, last month was remarkable for many things. For example, despite the difficulties which beset the stand attendants (these were emphasised in our review of the exhibition in the 'JOURNAL' of September 15 and are now admitted by the Gas Council), cash orders to the value of £7,000 were booked on the sales section, in addition to firm inquiries to the value of £15,000.

Nearly 3,000 items of equipment, ranging from potato peelers to pressure cookers, were needed to keep the total of 300 women cooks happy for the fortnight's run. Most interesting, however, was the astonishing variety of food which had to be obtained. This was the task of Mr. Joe Cross, the Gas Council's catering consultant, who was asked to supply 860 items of food, ranging from sixpenn'orth of marrow bones to an order for one kilo of vanilla pods which, at 1s. 3d. a pod, had he supplied that quantity, would have cost £36.

Forty different kinds of fish, from carp to squid, and every conceivable cut of meat was required. No less than 27 different varieties of spice, 1,500 eggs and six different kinds of butter were required.

New Showroom in North East

The North Eastern Gas Board opened its new showroom and service centre at Woodlands, near Doncaster, on September 14. Councillor C. T. Bowater, Chairman of the Adwick-le-Street Urban District Council, performed the official opening.

Among Board officials present were Mr. Norman Hudson, Chief Commercial Officer, Mr. D. C. Henderson, Assistant Commercial Officer, and Mr. C. L. Maunder, Publicity.

Dr. R. S. Edwards, Chairman of the Board, in proposing a vote of thanks to Councillor Bowater, said the new centre would serve an area of 10-12 sq. miles in which there were already about 4,000 consumers.

Yorkshire Copper Works Films

In 1949, and again in 1951, the Yorkshire Copper Works, Ltd., made sound films illustrating the manufacture of 'Yorkshire' tubes and fittings, and depicting the services these products perform for people who handle and rely on them. The reception given these earlier films encouraged the Company to have others prepared, which were shown to the trade and Press in London on September 30.

'The "Yorkshire" Point of View' tells the manufacturer's special story from an entirely fresh point of view, and so brings right up to date the picture of the most modern methods, techniques and equipment now in use both inside and outside the works. Many new and complex machines and testing equipment are shown and viewers can also appreciate the thoroughness of training given to surpervisors, foremen, and workpeople. The audience is also taken out of the works itself to see how research is not confined only to the laboratories. Duration is about 30 mins.

'The Plumber's Way' is the second film and the audience, with the help of 3-D, looks over the shoulder of the craftsman plumber actually at work with 'Yorkshire' tubes and capillary fittings. The film takes as its scope the basic principle of the capillary joint, with interesting pictorial explanations; the principal operations used in the 'Yorkshire' system; and a general idea of the field of operations of the system. It is a film of interest to all whose work lies with tubes and fittings but it has a special appeal to students and apprentices. Duration is about 10 mins.

Air Pollution: South African Problem

Amid the usual campaigning comment and slightly bitter reporting in the autumn issue of *Smokeless Air*, is the story of a sensational South African municipal upheaval caused by an air pollution problem.

The Standard-Vacuum Refining Company of South Africa was requested by the Durban City Council to close its £6 mill. oil refinery. It is the first oil refinery in the Union and is intended to produce 80 mill. gal. of petrol annually.

But the plant is situated in a residential district of Durban called the Bluff, and soon after the plant began operations there were complaints from local residents that pollution was making life impossible.

After a residents' vigilance committee had been formed, and the City Council had set up a sub-committee to investigate, Bluff residents and councillors were assured by the company that the fumes would be eliminated by the end of March by means of additional equipment.

This quarter's *Smokeless Air* can be obtained from the National Smoke Abatement Society, 30, Grosvenor Place, London, S.W.1. The subscription rate is 4s. per annum, post-free.

Diets for Slimming

The Cardiff undertaking of the Wales Gas Board recently ran a series of six weekly demonstrations of 'Diets Designed to Slim.' An advertisement was inserted in the local Press before the series commenced, inviting would-be slimmers to apply for tickets. This was necessary in view of the limited space available in the demonstration theatre.

The response was overwhelming, and the 140 tickets were allocated strictly in accordance with the receipt of applications. The Medical Officer of Health co-operated with the venture and a qualified dietitian was in attendance at each lecture.

W. & T. Avery, Ltd., loaned a weighing machine, and before the commencement of the series each member of the audience was weighed and given a card which was brought to each of the subsequent demonstrations and the ladies' weight again noted. Of the audience 29 ladies lost 14 lb. or above in the six weeks, 31 ladies lost between 7 and 14 lb., and 36 ladies lost amounts up to 7 lb. The series was so successful and the demand for tickets such that it has been decided to repeat the series next spring.

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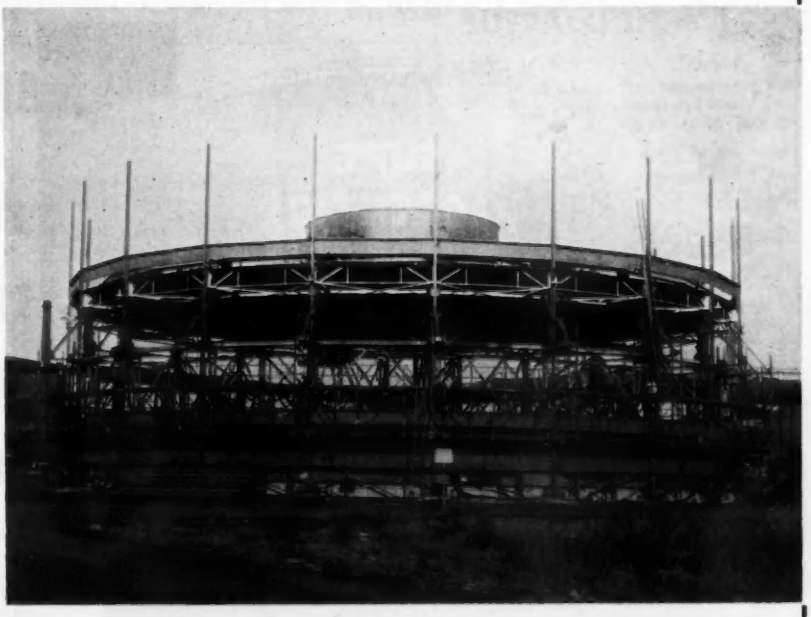

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Classified Advertisements: All small classified advertisements are charged at **1/9** per line (approx. **7** words)—minimum charge **10/6.** A Box Number address occupies **2** lines, and a further **6d.** is charged towards cost of postage on replies. Copy must be received by first post on Monday to ensure insertion in that week's Journal.

Displayed Advertisements: Rates obtainable on application to the Business Manager. Change of copy for displayed spaces must be received **14** days prior to publication if proofs are required. Type area of inside pages **10** in. deep × **7** in. wide; block screen **120.**

BUSINESS MANAGER: S. T. CULLEN

MIDLANDS MANAGER: G. B. Torrance, 42, Wychall Lane, King's Norton, Birmingham, 30. *Telephone:* Kings Norton 3868

NORTHERN MANAGER: Philip W. B. King, Flat 1, 7 Langcliffe Avenue, Harrogate. *Telephone:* Harrogate 67625.

SOUTHERN REPRESENTATIVE: A. Engelhardt, 11, Bolt Court, Fleet Street, E.C.4. *Telephone:* Central 2236-7

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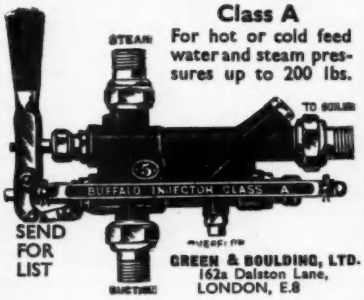

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A reprint of this most popular text book, incorporating numerous modifications and additions by the author, is in hand and we anticipate copies will be available by the end of the year.

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APPOINTMENTS VACANT

The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 inclusive or a woman aged 18-59 inclusive unless he or she, or the employment, is excepted from the provisions of the Notification of Vacancies Order, 1952.

WEST MIDLANDS GAS BOARD

ASSISTANT ENGINEER (CIVIL)

THE successful applicant will be in the Chief Engineer's Department, located in Birmingham, and will be responsible for the design, specification and preparation of Bills of Quantities for Civil Engineering projects.

Experience in carrying out similar work is essential and membership of The Institution of Civil Engineers or an equivalent qualification will be required.

The commencing salary will be not less than £1,050 per annum.

The post is pensionable and the successful candidate may be required to pass a medical examination.

Applications, stating age, qualifications and experience, together with the names of two referees, should be addressed to the Industrial Relations Officer, West Midlands Gas Board, 6, Augustus Road, Edgbaston, Birmingham, 15, to reach him within fifteen days of the appearance of this advertisement.

F. H. CURETON,
Secretary to the Board.

WEST MIDLANDS GAS BOARD

CHIEF INTERNAL AUDITOR

APPLICATIONS are invited for the above position on the staff of the CHIEF ACCOUNTANT in Birmingham.

The post carries the responsibility for the control of the internal audit organisation throughout the area of the Board.

The salary is £1,200 × £50—£1,350 per annum.

Candidates must be qualified accountants, preferably with experience of public utility accounts and internal audit.

The post is pensionable and the successful candidate may be required to pass a medical examination.

Applications, stating age, education, experience, qualifications and the names of two referees, should be addressed to the Industrial Relations Officer, West Midlands Gas Board, 6, Augustus Road, Edgbaston, Birmingham, 15, to reach him within fifteen days of the appearance of this advertisement.

F. H. CURETON,
Secretary to the Board.

SOUTHERN GAS BOARD

QUALIFIED ASSISTANT ACCOUNTANT

A qualified ASSISTANT is required for the Chief Accountant's Office at Southampton. The work will be varied and interesting. A knowledge of modern methods of cost accountancy would be an advantage.

The commencing salary will be in the region of £800 per annum according to qualifications and experience.

The successful candidate, unless already subject to a Pension Scheme by virtue of the Gas (Pension Rights) Regulations, 1950, will be required to join the Board's Staff Pension Scheme within six months from taking up the appointment.

Applications stating age, education, qualifications, training, experience and present salary, together with a one-page summary of these particulars, should be sent in an envelope marked "Assistant Accountant" to the Secretary, Southern Gas Board, 164, Above Bar, Southampton, to reach him not later than November 9, 1954.

SOUTHERN GAS BOARD

NORTHERN DIVISION
OXFORD AND DISTRICT
GAS UNDERTAKING

APPLICATIONS are invited for the following positions :—

(*a*) TECHNICAL ASSISTANT (DISTRIBUTION)
Applicants should have good knowledge of methods of laying high and low pressure mains and be capable of planning and estimating for new work.

(*b*) DISTRICT SALESMAN
Applicants should be keen salesmen, having sound knowledge of modern domestic equipment and should preferably have had some practical fitting experience.

The commencing salary for both positions will be within Grade A.P.T. IV (£335–£525).

The successful applicants will be required to contribute to the Board's Superannuation Scheme and may be required to pass a medical examination.

Applications, stating age and experience and giving details of training and the names of two referees, should reach the undersigned not later than October 30, 1954.

S. C. BENTLEY,
Engineer and General Manager.

Therm House,
St. Aldates,
Oxford.

NORTH THAMES GAS BOARD

THE following SENIOR DRAUGHTSMEN are required in the CHIEF ENGINEER'S Drawing Office at WESTMINSTER, S.W.1.:—

(i) for the design and layout of general process plant and all associated structural steelwork.

(ii) for the design of materials handling plant and the detailing of associated steelwork.

Candidates should preferably be corporate Members of the Institutions of Civil, Structural or Mechanical Engineers. Starting salaries within the range £745 to £895 per annum, according to age, qualifications and experience. The successful candidates will be required to join the Staff Pension Scheme.

Applications, giving age and full particulars, should be sent to the Staff Controller, North Thames Gas Board, 30, Kensington Church Street, London, W.8, quoting reference 666/191.

WALES GAS BOARD

DISTRIBUTION AND SALES
SUPERINTENDENT—
NEATH UNDERTAKING

APPLICATIONS are invited for the position of DISTRIBUTION AND SALES SUPERINTENDENT in the above Undertaking. The minimum qualification for the appointment is the City and Guilds Final Certificate in Gas Fitting, but strong preference will be given to candidates holding certificates in the Technology of Gas Supply.

The successful applicant will be responsible to the Engineer and Manager for the entire Distribution side of the Undertaking which incorporates both high and low pressure distribution and supplies a number of major industrial consumers.

On the Sales side the successful applicant will also be responsible for general supervision of Showrooms and for the interviewing of prospective consumers in the development of new business.

The salary will be at an appropriate step of A.P.T. VIIIA of the National Scales (£605/£685). The post is pensionable.

The successful applicant may be required to pass a medical examination.

Applications, stating age, qualifications and experience, with details of present position, giving the names of two referees, to be forwarded to the undersigned within seven days of this publication.

G. FITTON
Engineer and Manager.

Gas Works,
Millands, Neath.

FLAVELS of Leamington have a vacancy in their Research Laboratory for a PHYSICIST or PHYSICAL CHEMIST, mainly connected with gas water heating. University degree or equivalent desirable but not essential. Apply, stating salary required, to the Technical Director, Sidney Flavel & Co. Ltd., Leamington.

MINISTRY OF SUPPLY requires GAS WORKS FOREMAN at Woolwich for Intermittent Vertical Chamber Oven Plant. *Qualifications* : British of British parents. Appropriate apprenticeship. Experience of gas plant maintenance essential, O.N.C. or City and Guilds or equivalent qualification desirable. *Salary* : Within £665 (age 30)—£780. Not established but opportunities to compete for establishment may arise. House available on site, reasonable rent. Application forms from A.1.900 Ministry of Labour and National Service, London Appointments Office, 1-6, Tavistock Square, W.C.1.

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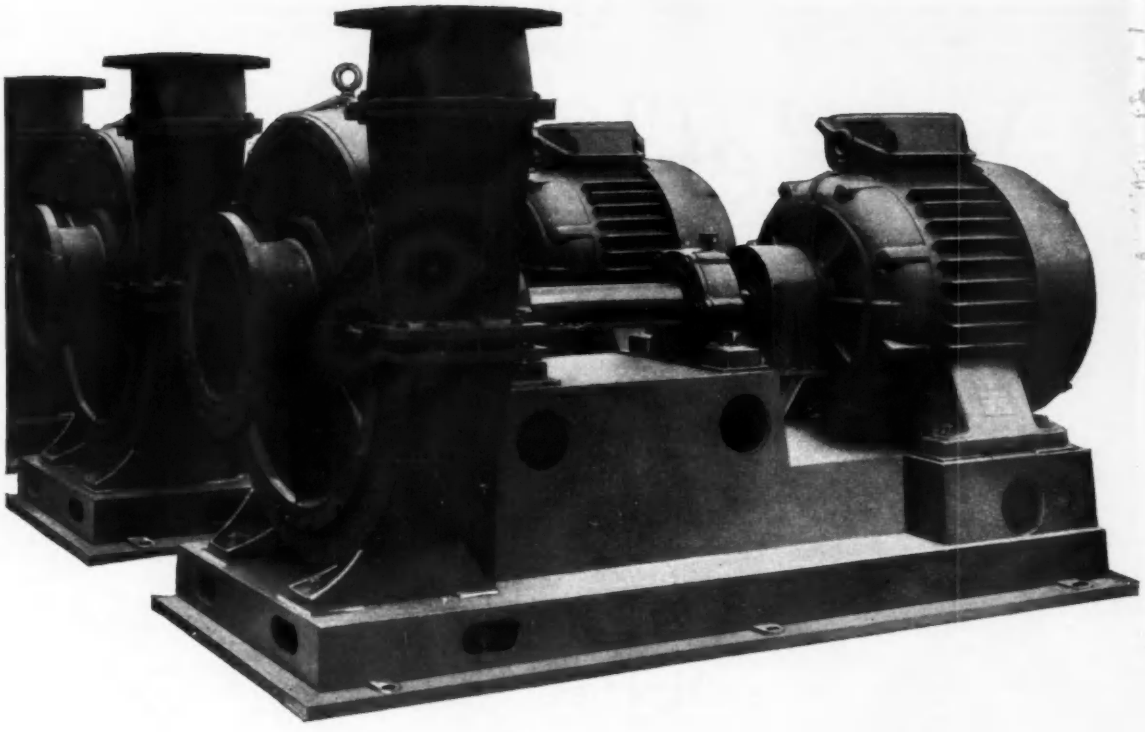
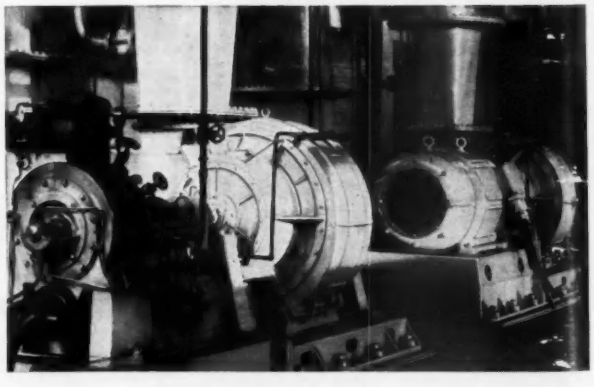


Gas Boosters?

Photo by courtesy of the S. E. Gas Board and Humphreys & Glasgow Ltd.



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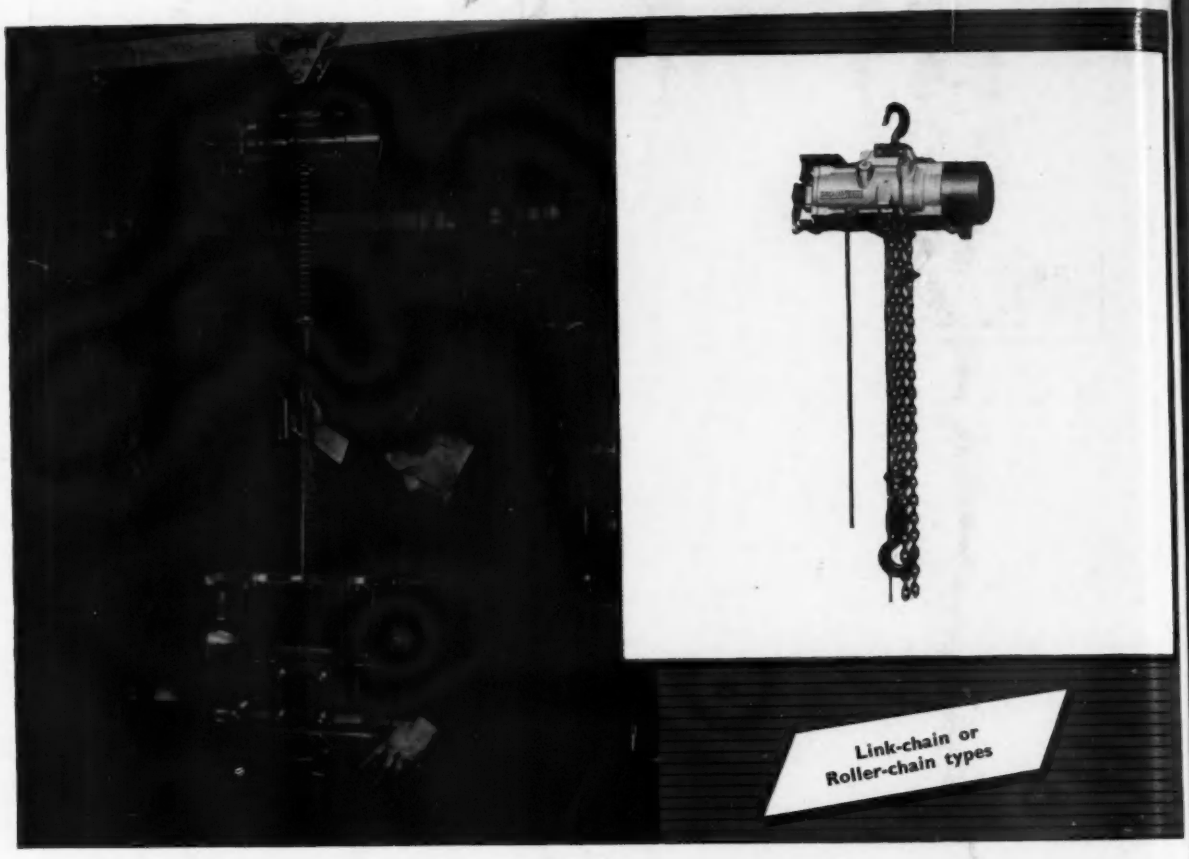

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